FIG. 1

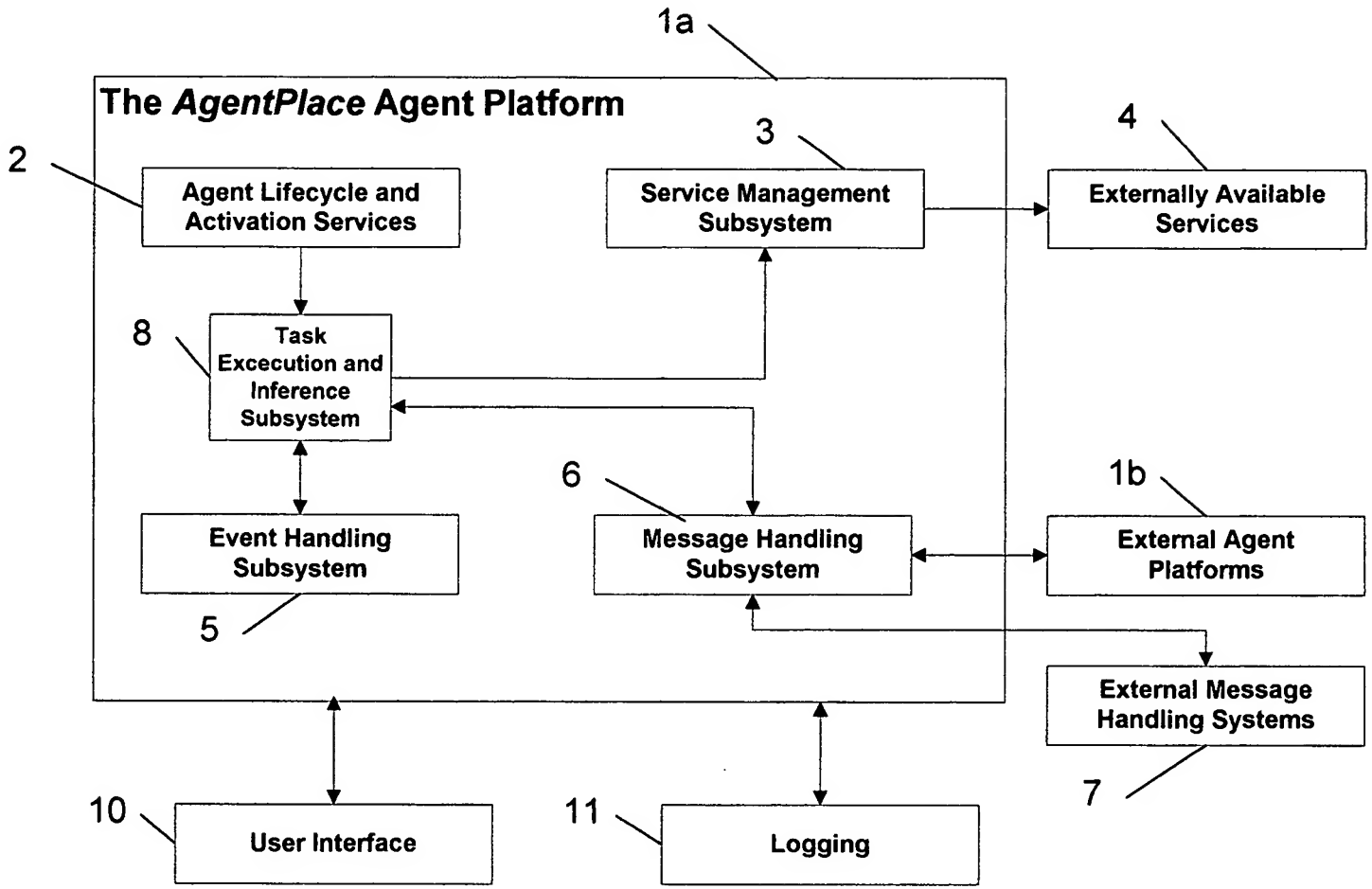

1a
The AgentPlace Agent Platform
2
Agent Lifecycle and Activation Services
3
Service Management Subsystem
4
Externally Available Services
8
Task Excecution and Inference Subsystem
6
Event Handling Subsystem
5
Message Handling Subsystem
1b
External Agent Platforms
External Message Handling Systems
7
10
User Interface
11
Logging

FIG. 2

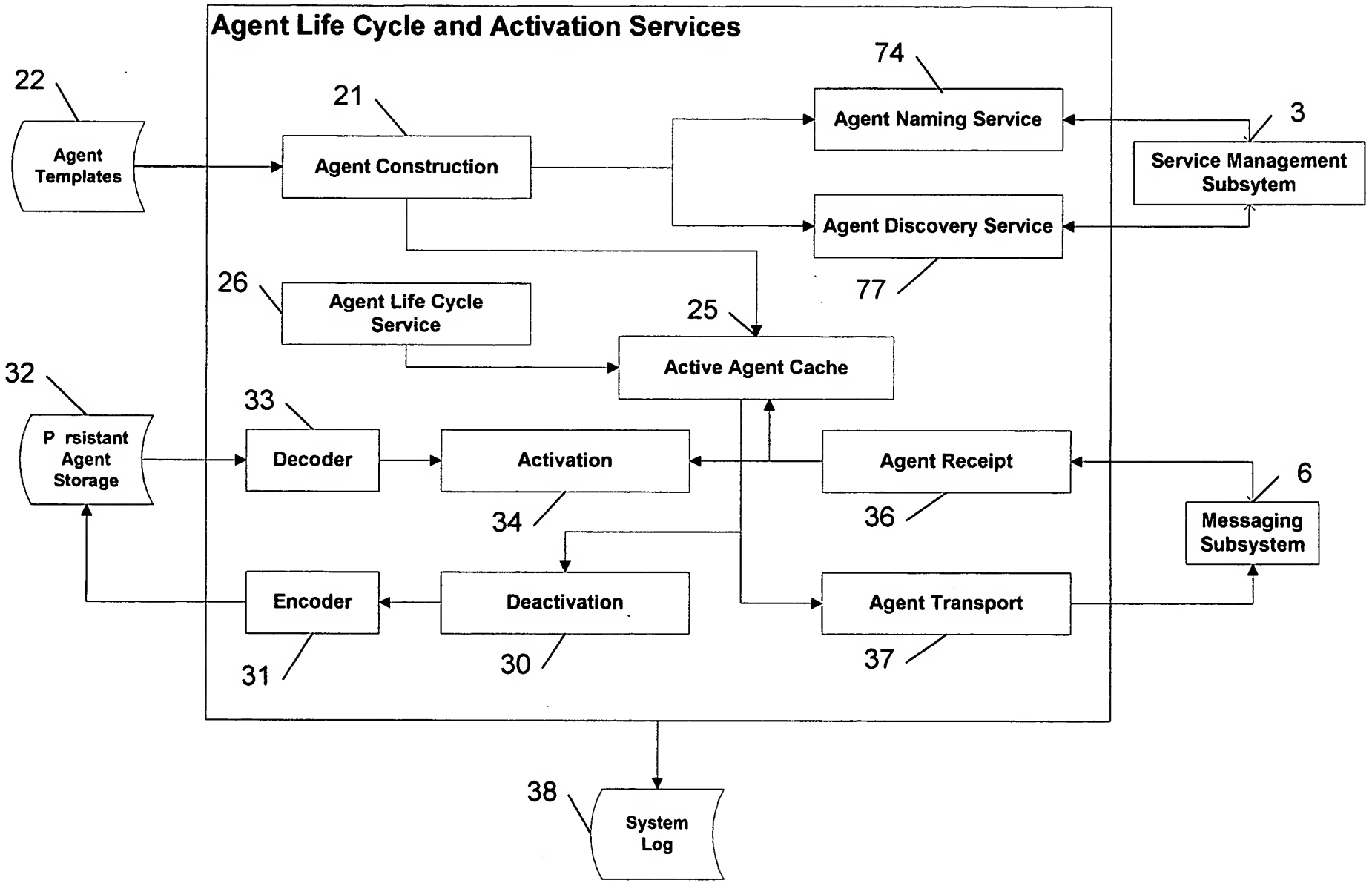

Agent Life Cycle and Activation Services
22
Agent Templates
21
Agent Construction
74
Agent Naming Service
3
Service Management Subsytem
Agent Discovery Service
77
26
Agent Life Cycle Service
25
Active Agent Cache
32
P rsistant Agent Storage
33
Decoder
Activation
34
Agent Receipt
36
6
Messaging Subsystem
Encoder
31
Deactivation
30
Agent Transport
37
38
System Log

FIG. 3

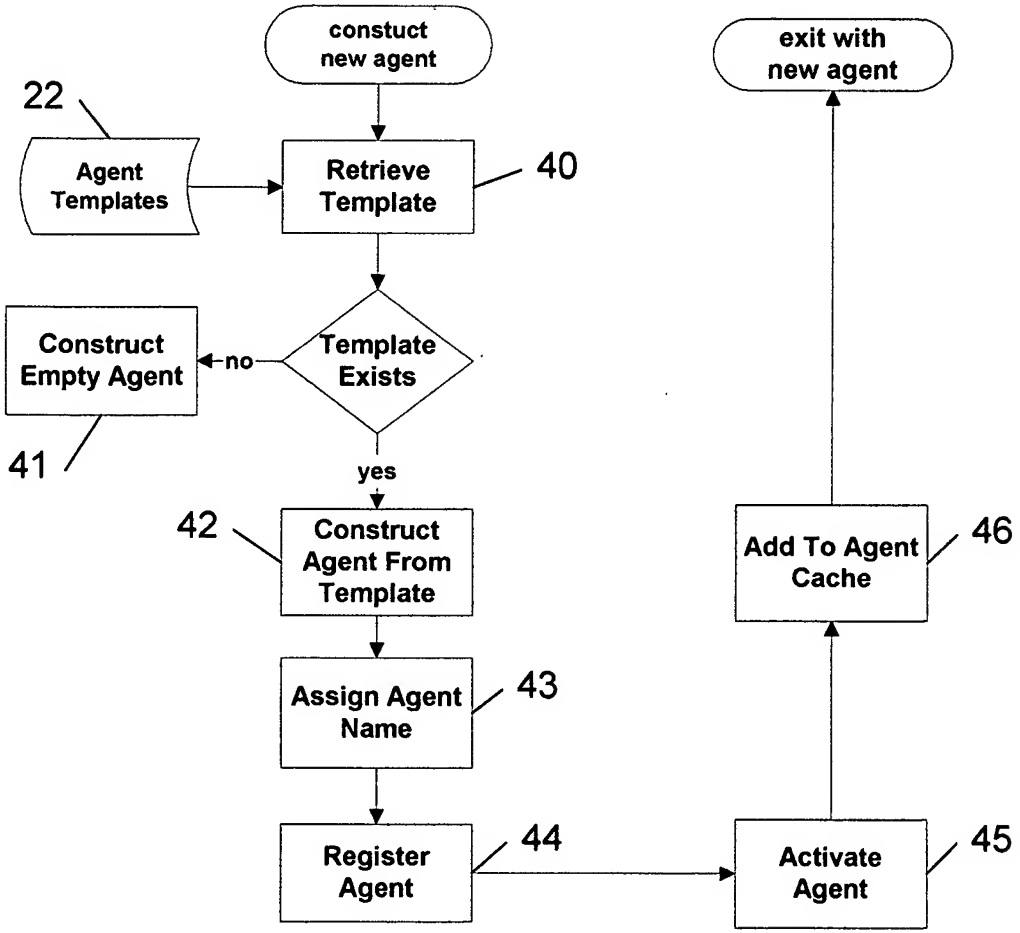

constuct new agent
exit with new agent
22
Agent Templates
Retrieve Template
40
Construct Empty Agent
no
Template Exists
41
yes
42
Construct Agent From Template
Add To Agent Cache
46
Assign Agent Name
43
Register Agent
44
Activate Agent
45

FIG. 4

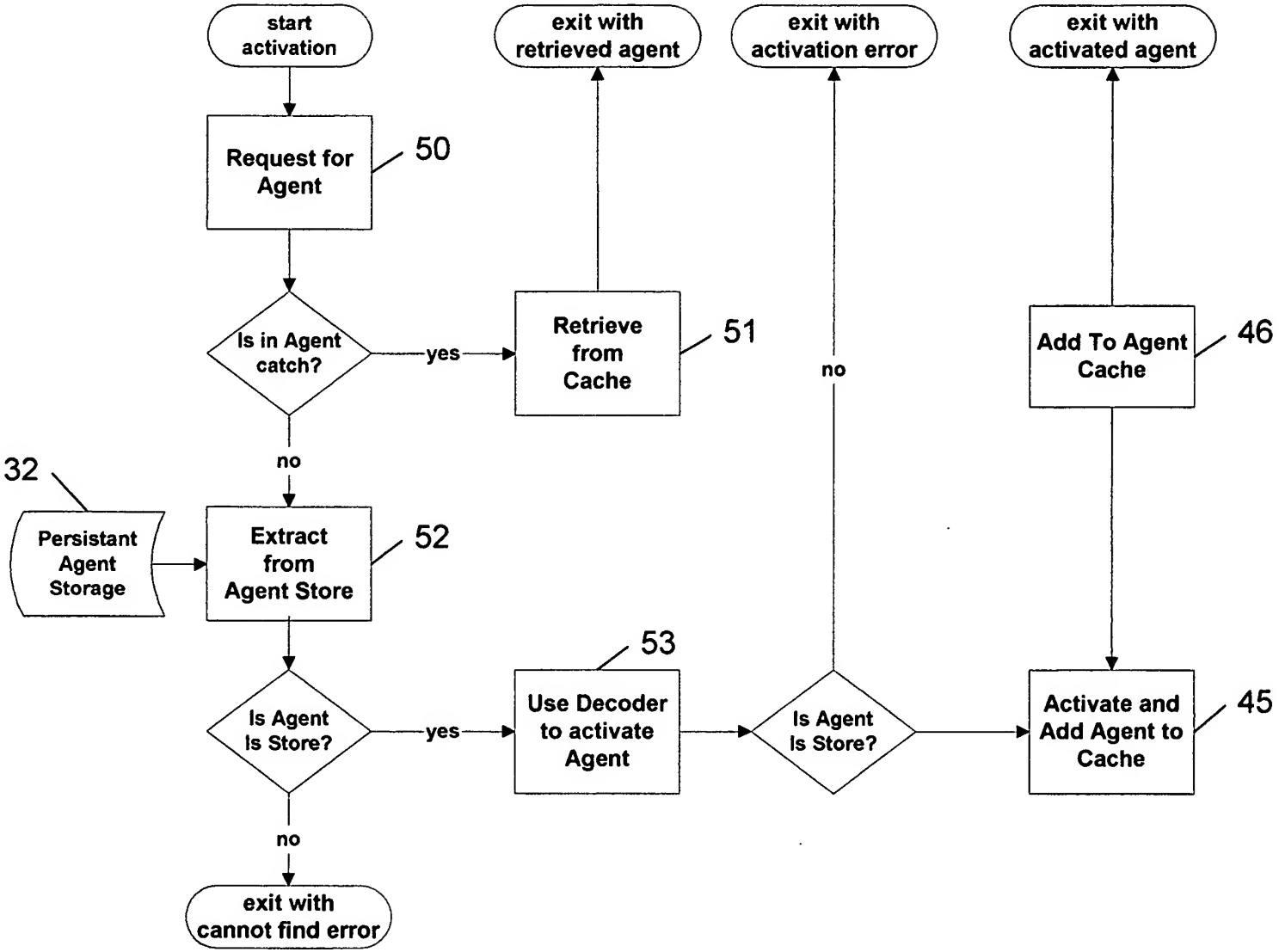

start activation
exit with retrieved agent
exit with activation error
exit with activated agent
Request for Agent
50
Is in Agent catch?
yes
Retrieve from Cache
51
no
Add To Agent Cache
46
32
Persistant Agent Storage
Extract from Agent Store
52
53
Is Agent Is Store?
yes
Use Decoder to activate Agent
Is Agent Is Store?
no
Activate and Add Agent to Cache
45
no
exit with cannot find error

FIG. 5

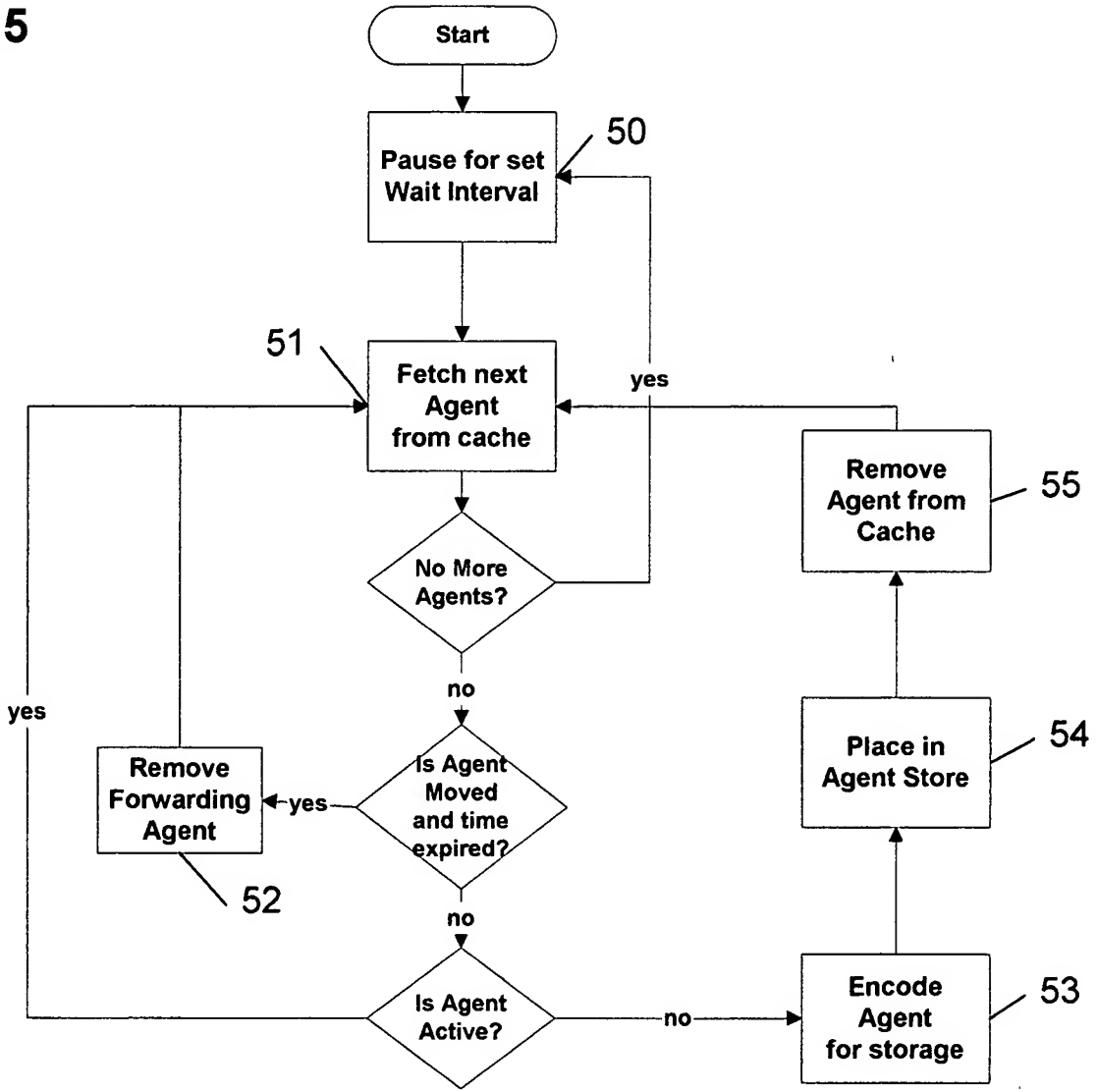

Start
Pause for set Wait Interval
50
51
Fetch next Agent from cache
yes
Remove Agent from Cache
55
No More Agents?
no
yes
Remove Forwarding Agent
yes
Is Agent Moved and time expired?
Place in Agent Store
54
52
no
Is Agent Active?
no
Encode Agent for storage
53

FIG. 6

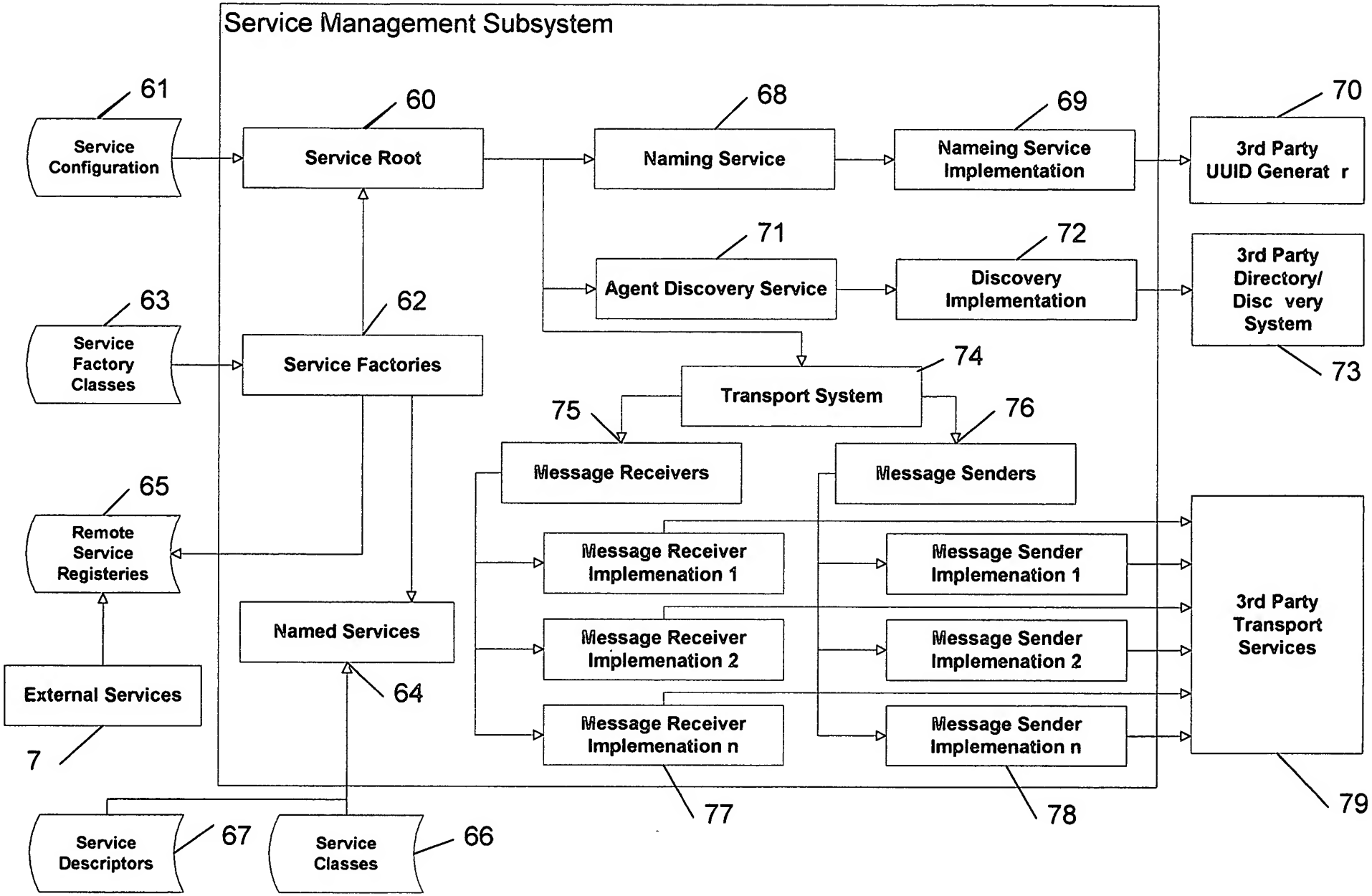

Service Management Subsystem
61
Service Configuration
60
Service Root
68
Naming Service
69
Nameing Service Implementation
70
3rd Party UUID Generat r
71
Agent Discovery Service
72
Discovery Implementation
3rd Party Directory/ Disc very System
73
63
Service Factory Classes
62
Service Factories
74
Transport System
75
76
Message Receivers
Message Senders
65
Remote Service Registeries
Message Receiver Implemenation 1
Message Sender Implemenation 1
3rd Party Transport Services
Named Services
Message Receiver Implemenation 2
Message Sender Implemenation 2
64
External Services
Message Receiver Implemenation n
Message Sender Implemenation n
7
77
78
79
Service Descriptors
67
Service Classes
66

FIG. 7

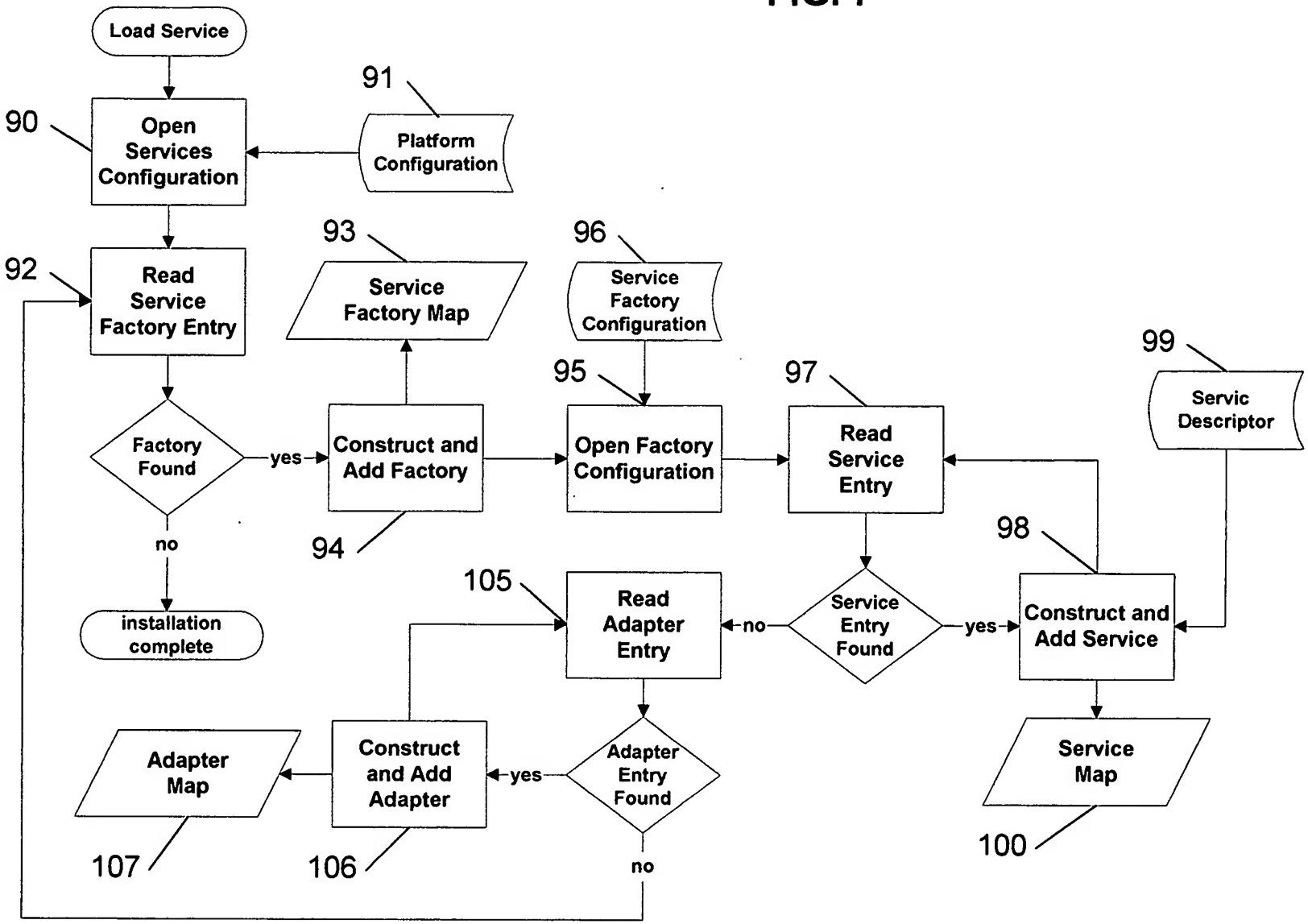

Load Service
90
Open Services Configuration
91
Platform Configuration
92
Read Service Factory Entry
93
Service Factory Map
96
Service Factory Configuration
99
Servic Descriptor
95
97
Factory Found
yes
Construct and Add Factory
Open Factory Configuration
Read Service Entry
no
94
98
installation complete
105
Read Adapter Entry
no
Service Entry Found
yes
Construct and Add Service
Adapter Map
Construct and Add Adapter
yes
Adapter Entry Found
Service Map
107
106
no
100

FIG. 8

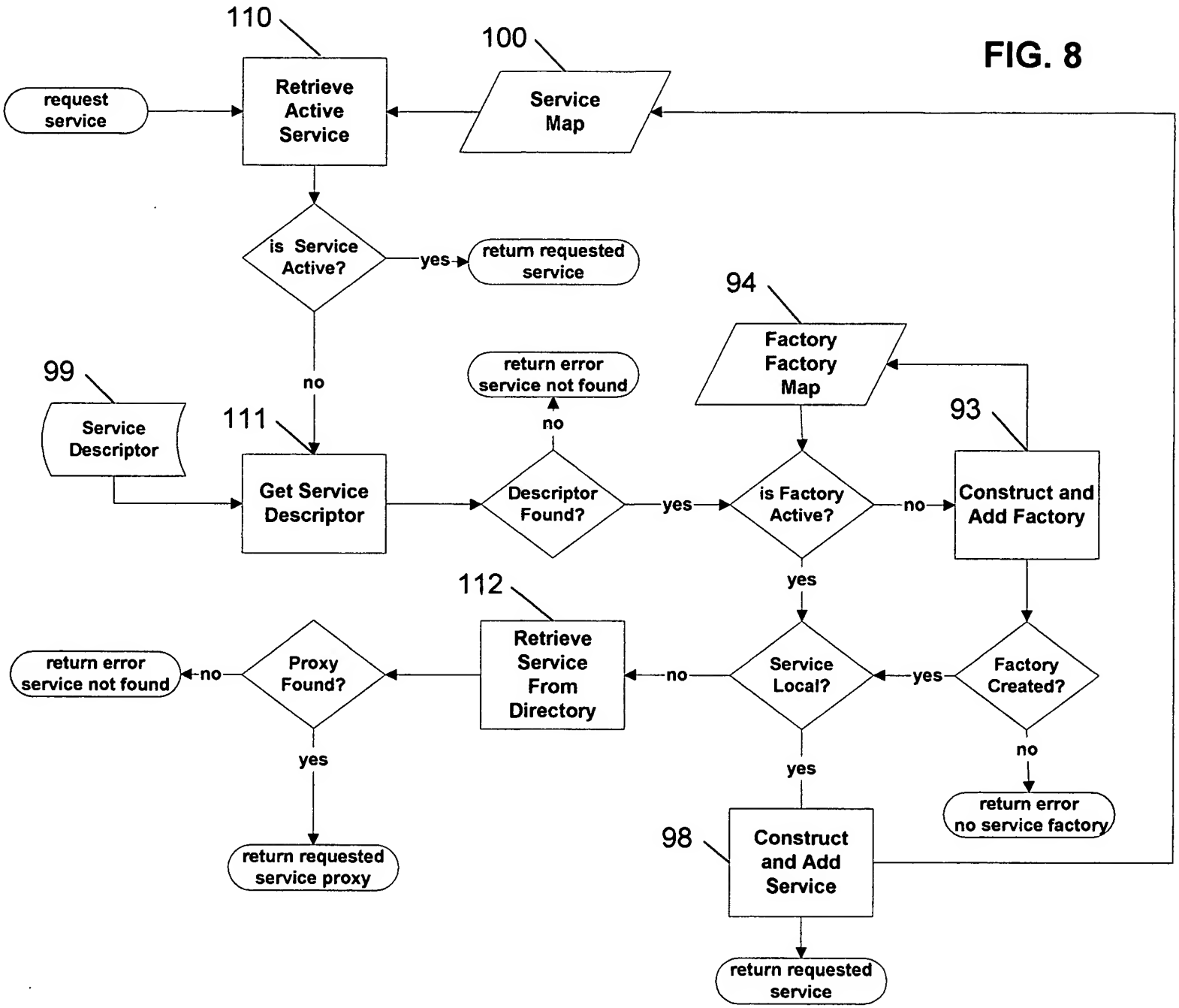

110
100
request service
Retrieve Active Service
Service Map
is Service Active?
yes
return requested service
no
99
Service Descriptor
111
Get Service Descriptor
return error service not found
no
Descriptor Found?
yes
94
Factory Factory Map
is Factory Active?
no
93
Construct and Add Factory
yes
112
Retrieve Service From Directory
no
Service Local?
yes
Factory Created?
no
return error no service factory
yes
return error service not found
no
Proxy Found?
yes
return requested service proxy
98
Construct and Add Service
return requested service

FIG. 9

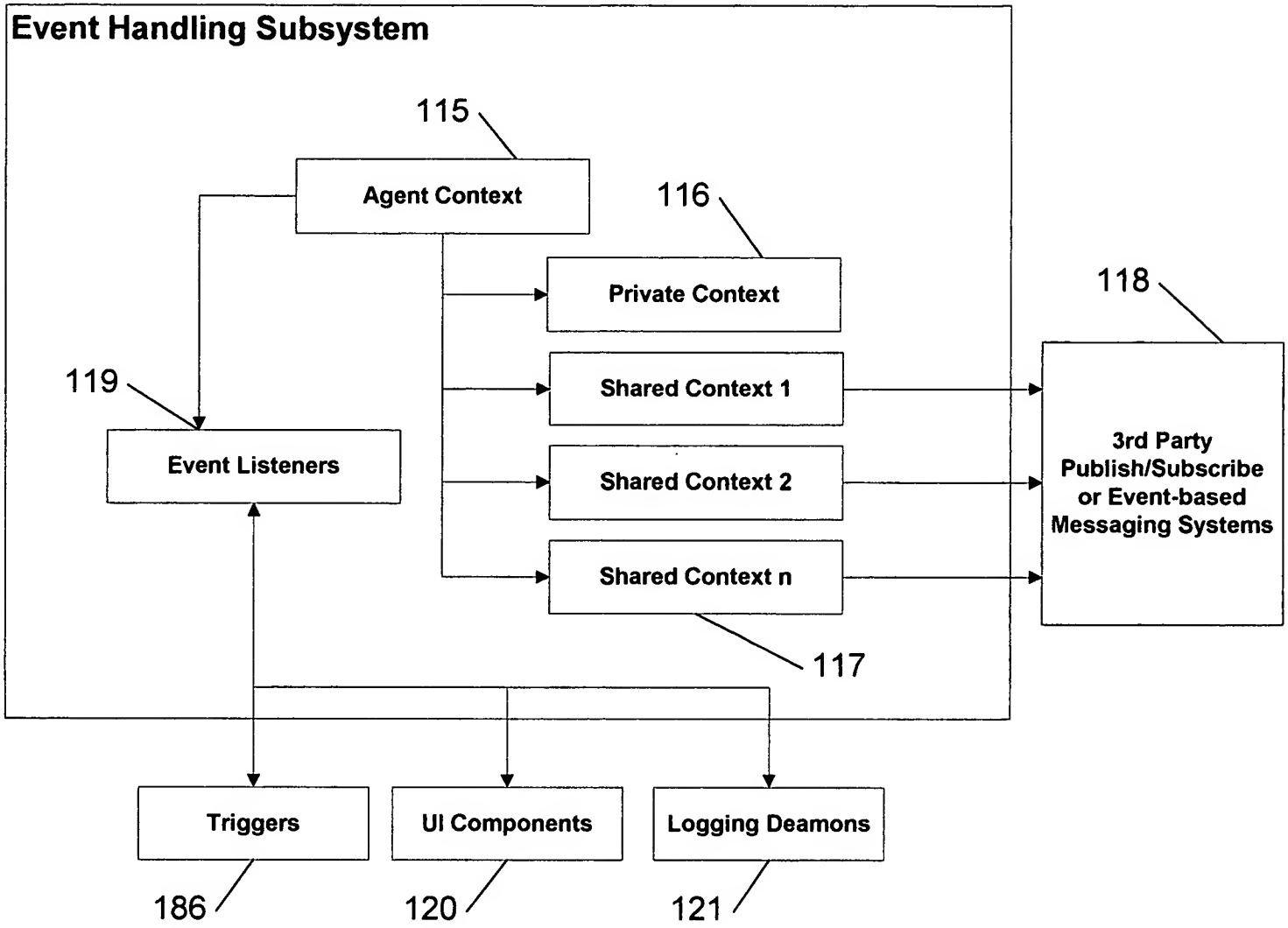

Event Handling Subsystem
115
Agent Context
116
Private Context
118
119
Shared Context 1
Event Listeners
Shared Context 2
3rd Party Publish/Subscribe or Event-based Messaging Systems
Shared Context n
117
Triggers
UI Components
Logging Deamons
186
120
121

FIG. 10

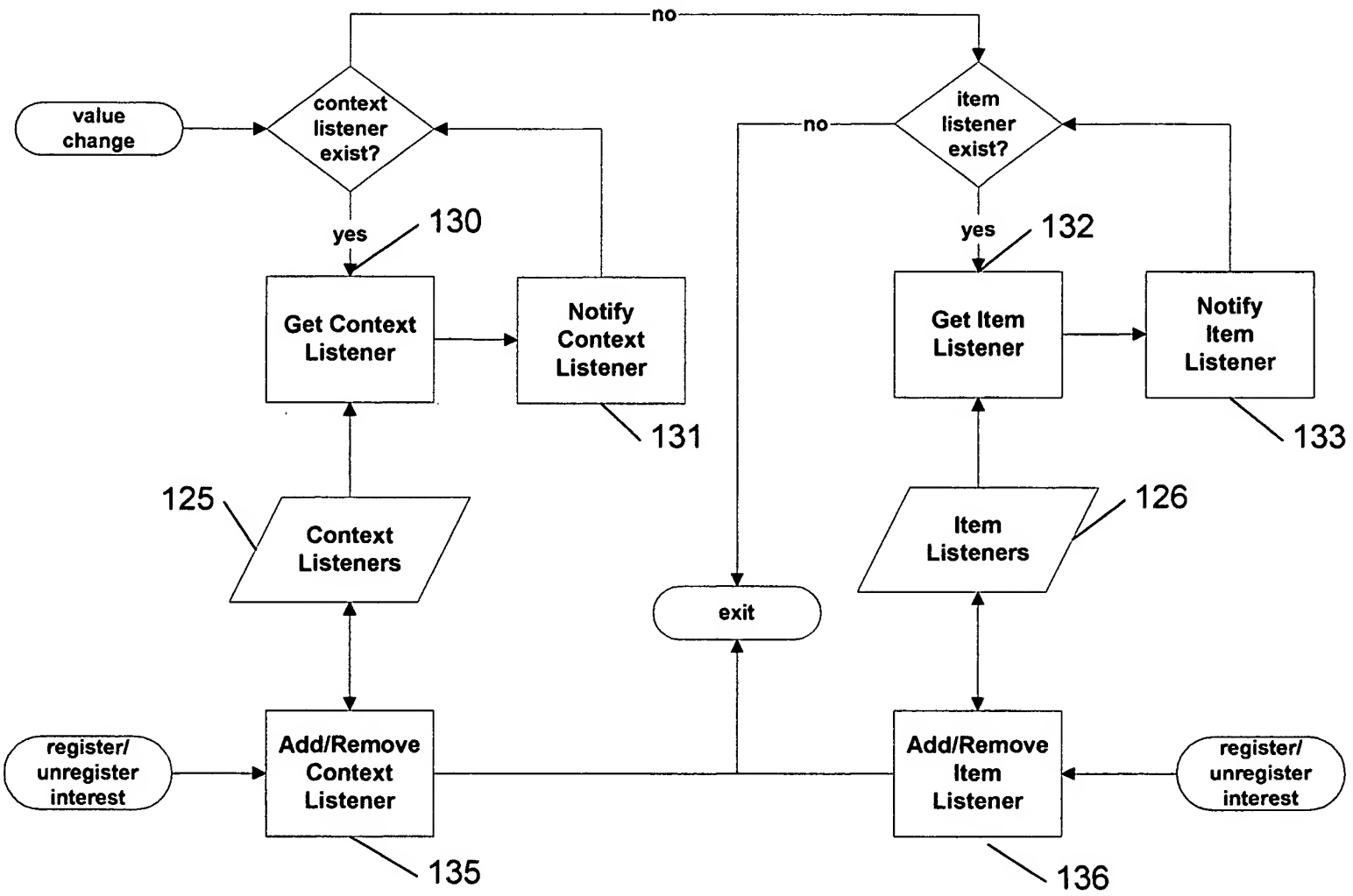

no
value change
context listener exist?
yes
130
Get Context Listener
Notify Context Listener
131
125
Context Listeners
register/ unregister interest
Add/Remove Context Listener
135
item listener exist?
no
yes
132
Get Item Listener
Notify Item Listener
133
126
Item Listeners
exit
Add/Remove Item Listener
register/ unregister interest
136

FIG. 11

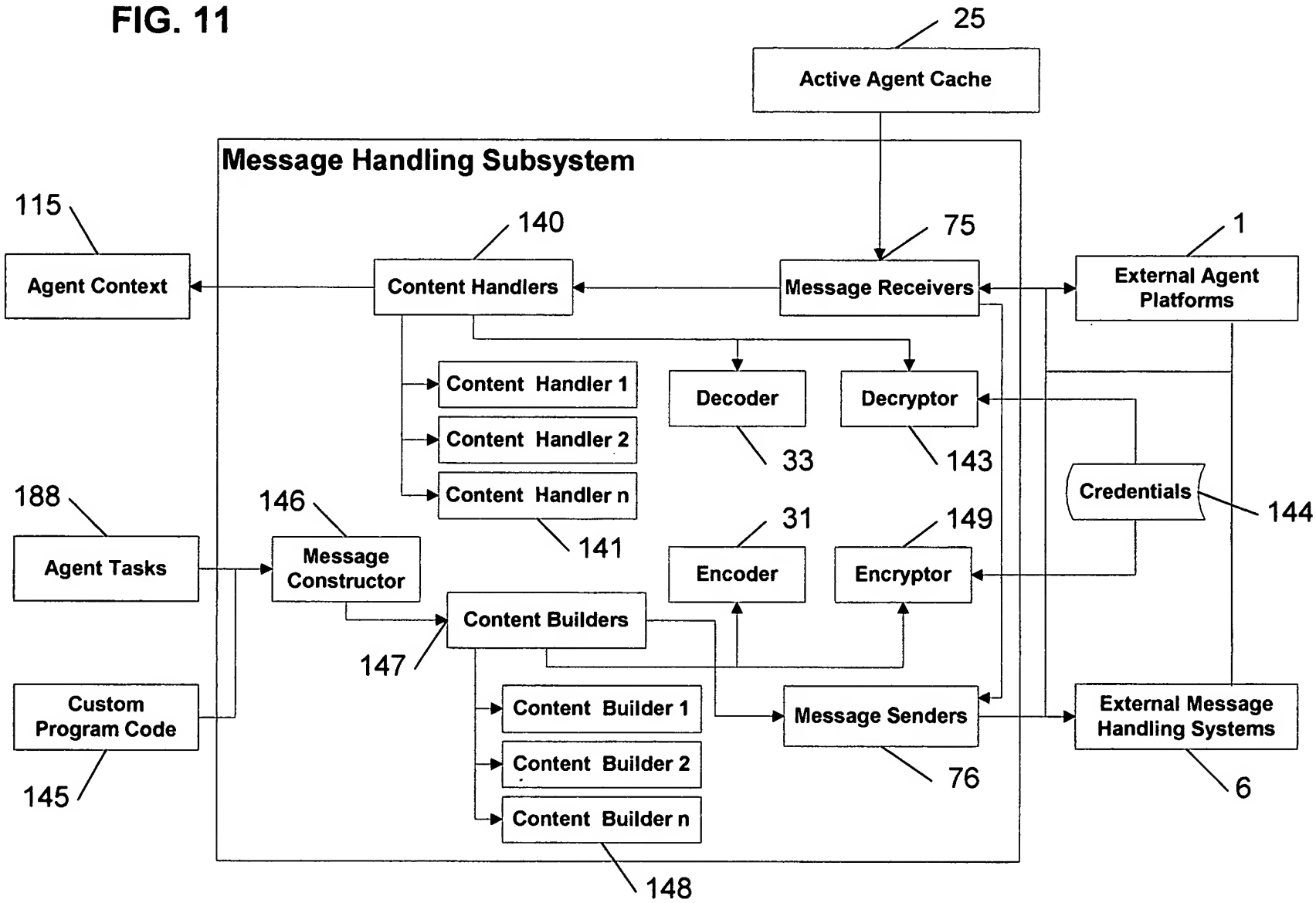

25
Active Agent Cache
Message Handling Subsystem
115
Agent Context
140
Content Handlers
75
Message Receivers
1
External Agent Platforms
Content Handler 1
Content Handler 2
Content Handler n
141
Decoder
33
Decryptor
143
Credentials
144
188
Agent Tasks
146
Message Constructor
31
Encoder
149
Encryptor
Content Builders
147
Custom Program Code
145
Content Builder 1
Content Builder 2
Content Builder n
148
Message Senders
76
External Message Handling Systems
6

FIG. 12

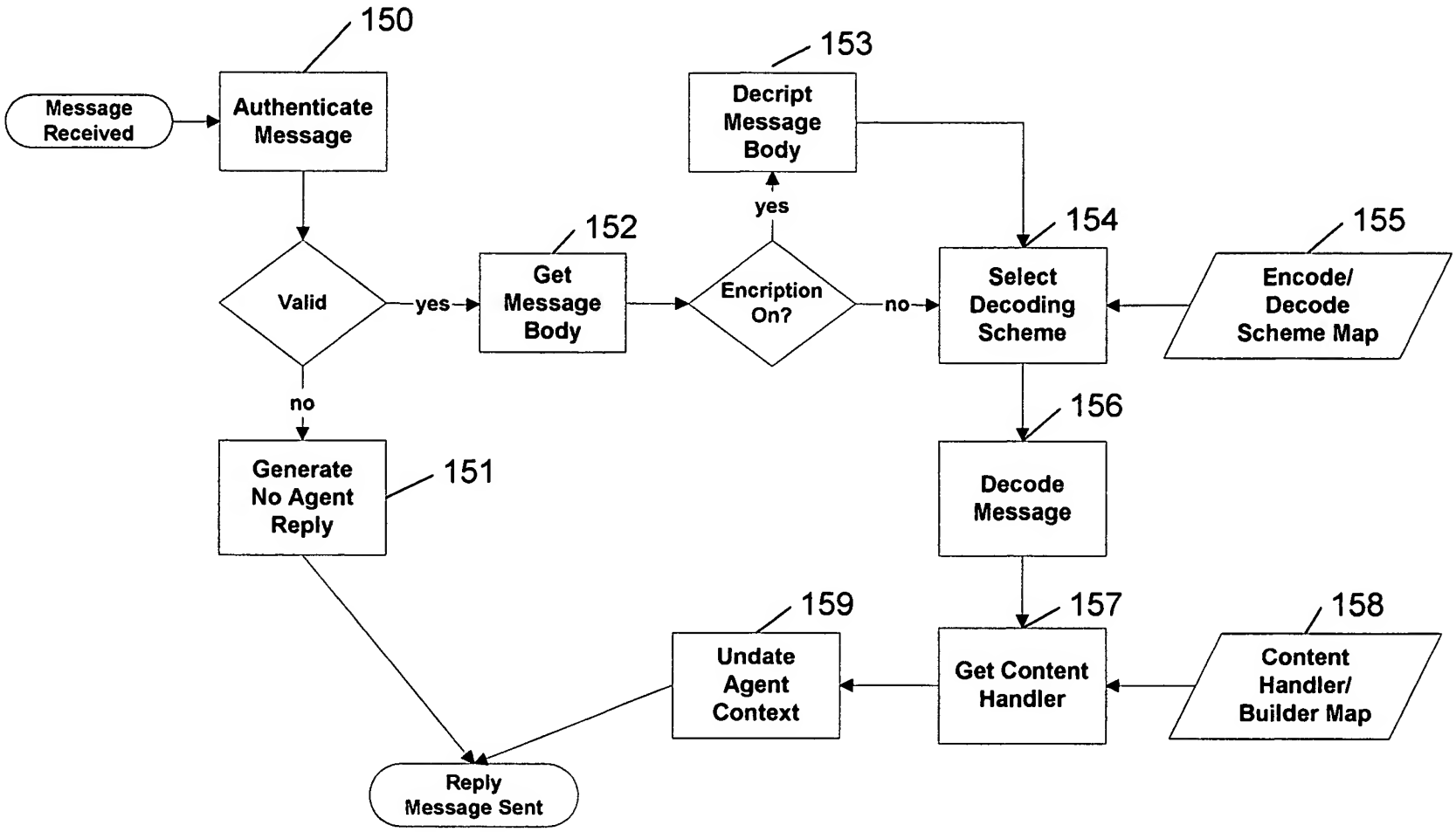

150
Message Received
Authenticate Message
153
Decript Message Body
yes
152
Valid
yes
Get Message Body
Encription On?
no
154
Select Decoding Scheme
155
Encode/ Decode Scheme Map
no
156
Generate No Agent Reply
151
Decode Message
159
157
158
Undate Agent Context
Get Content Handler
Content Handler/ Builder Map
Reply Message Sent

FIG. 13

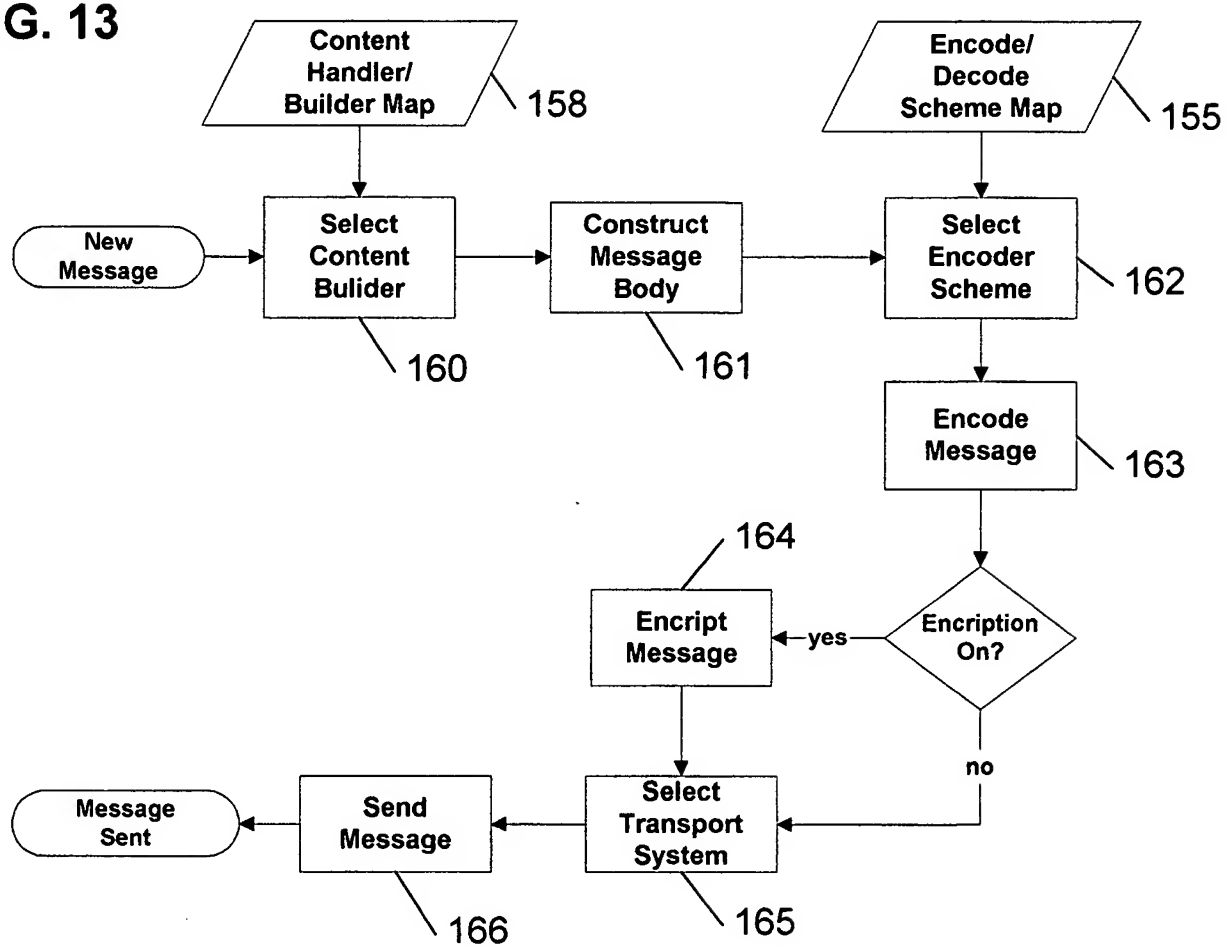

Content Handler/ Builder Map
158
Encode/ Decode Scheme Map
155
New Message
Select Content Bulider
160
Construct Message Body
161
Select Encoder Scheme
162
Encode Message
163
164
Encript Message
yes
Encription On?
no
Message Sent
Send Message
166
Select Transport System
165

FIG. 14

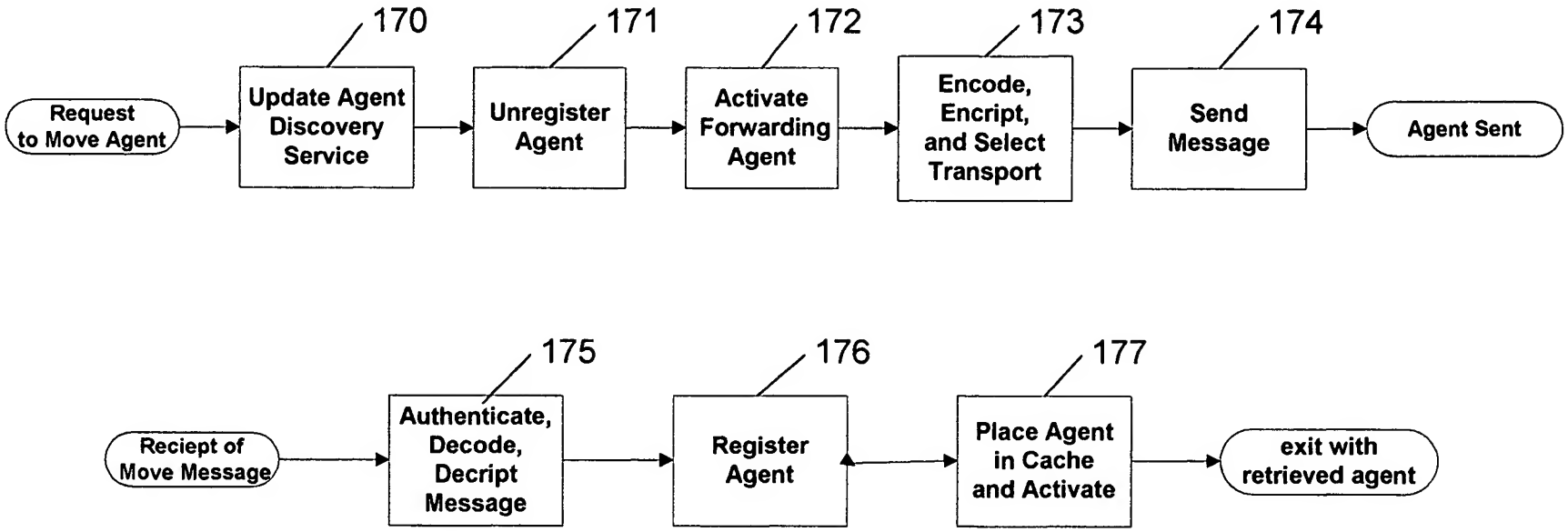

170
171
172
173
174
Request to Move Agent
Update Agent Discovery Service
Unregister Agent
Activate Forwarding Agent
Encode, Encript, and Select Transport
Send Message
Agent Sent
175
176
177
Reciept of Move Message
Authenticate, Decode, Decript Message
Register Agent
Place Agent in Cache and Activate
exit with retrieved agent

FIG. 15

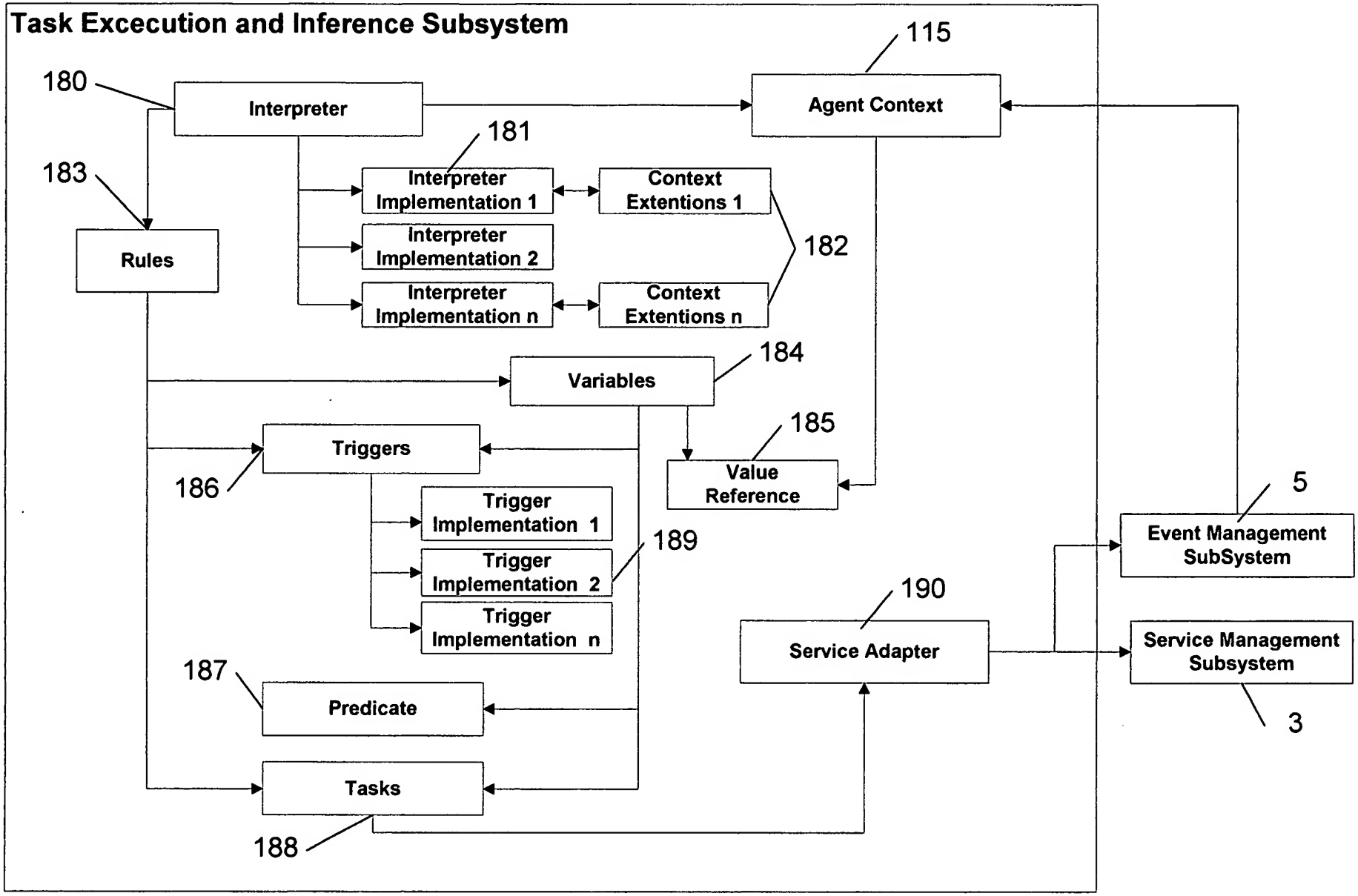

Task Excecution and Inference Subsystem
115
180
Interpreter
Agent Context
181
183
Interpreter Implementation 1
Context Extentions 1
Interpreter Implementation 2
Rules
182
Interpreter Implementation n
Context Extentions n
184
Variables
185
Triggers
Value Reference
186
Trigger Implementation 1
189
Trigger Implementation 2
Trigger Implementation n
5
Event Management SubSystem
190
Service Adapter
Service Management Subsystem
187
Predicate
3
Tasks
188

FIG. 16

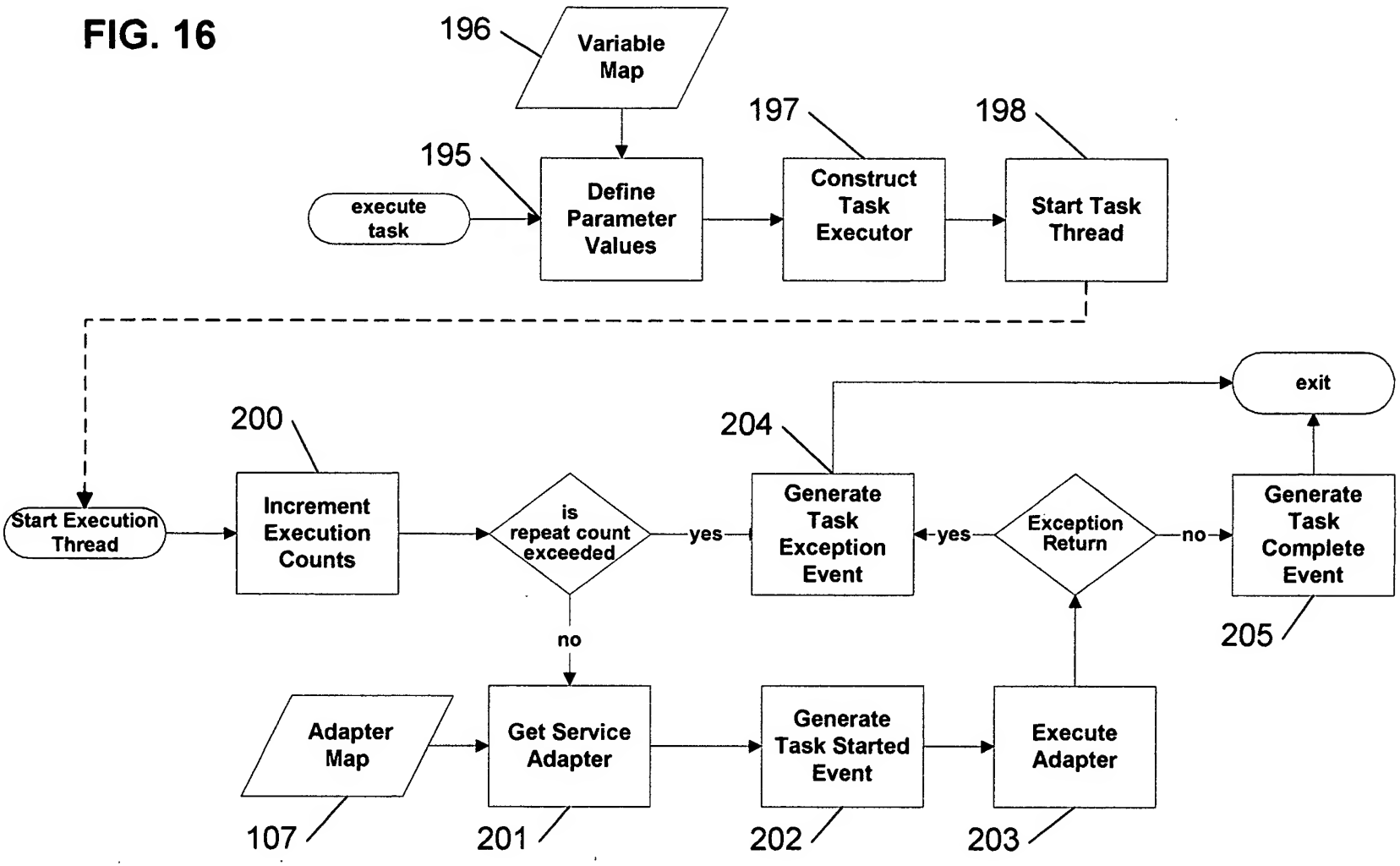

196
Variable Map
197
198
195
execute task
Define Parameter Values
Construct Task Executor
Start Task Thread
exit
200
204
Start Execution Thread
Increment Execution Counts
is repeat count exceeded
yes
Generate Task Exception Event
yes
Exception Return
no
Generate Task Complete Event
205
no
Adapter Map
Get Service Adapter
Generate Task Started Event
Execute Adapter
107
201
202
203

FIG. 17

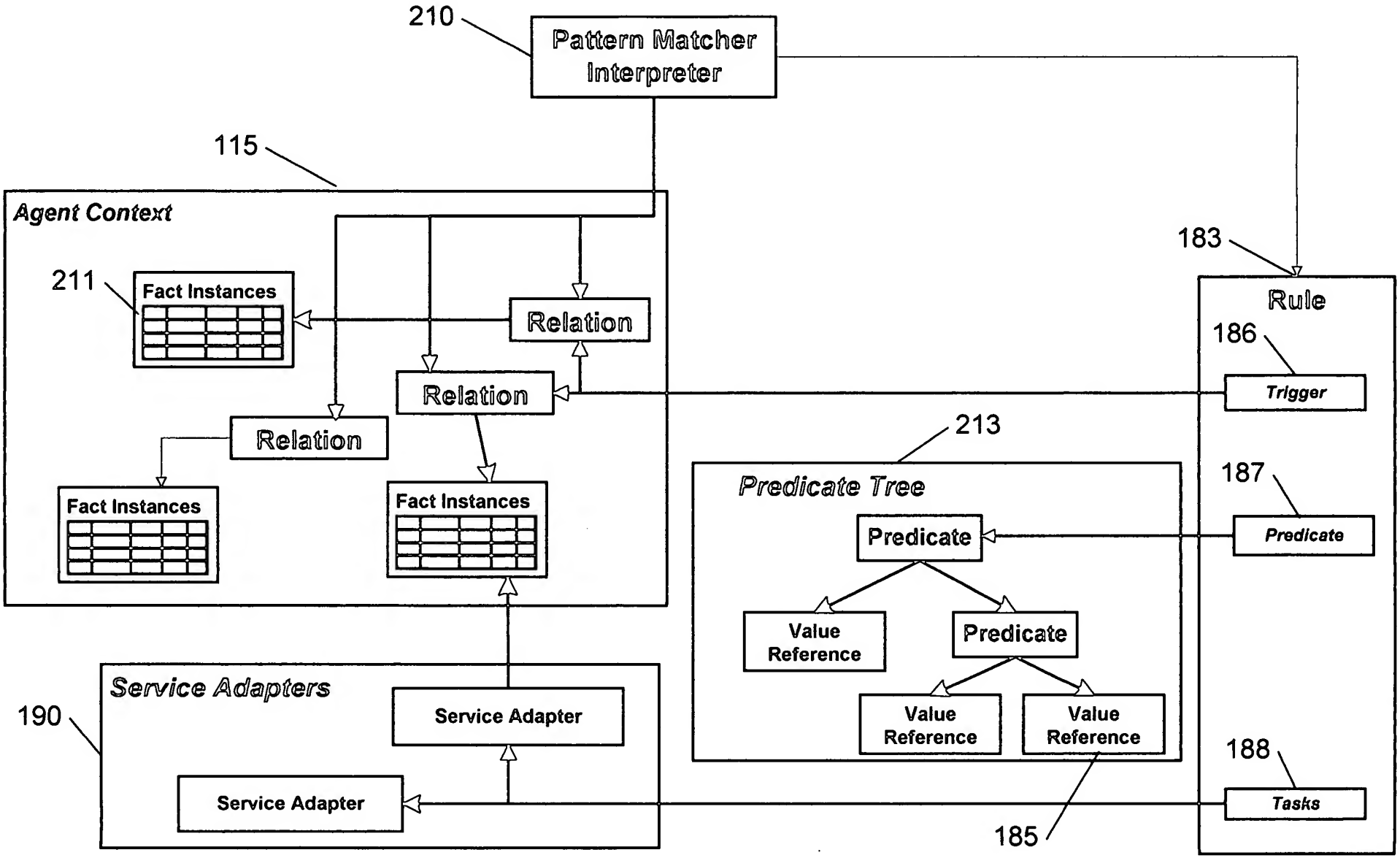

210
Pattern Matcher Interpreter
115
Agent Context
211
Fact Instances
Relation
Relation
Relation
Fact Instances
Fact Instances
183
Rule
186
Trigger
213
Predicate Tree
187
Predicate
Predicate
Value Reference
Predicate
Value Reference
Value Reference
188
Tasks
185
190
Service Adapters
Service Adapter
Service Adapter

FIG. 18

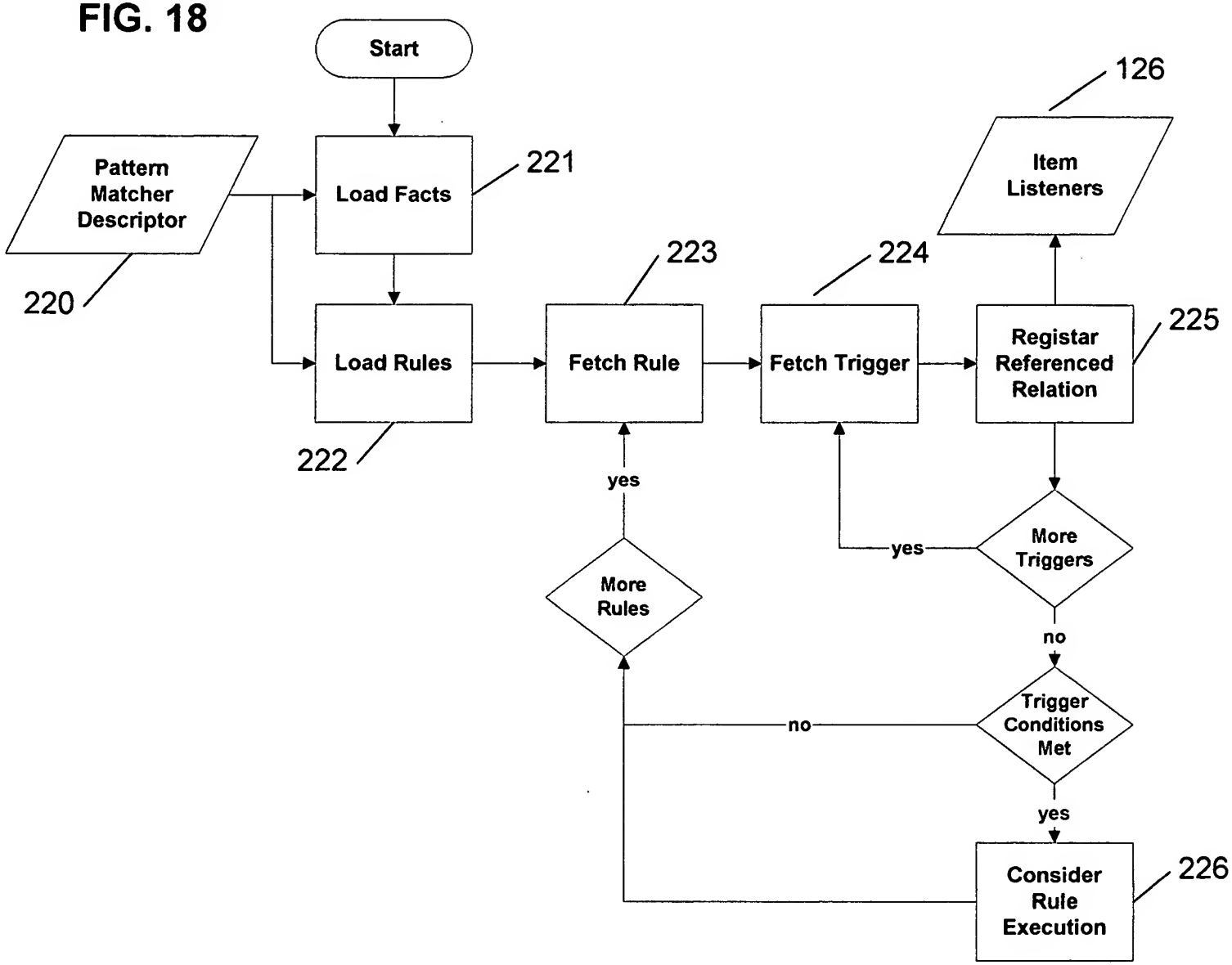

Start
Pattern Matcher Descriptor
220
Load Facts
221
Load Rules
222
Fetch Rule
223
Fetch Trigger
224
Registar Referenced Relation
225
Item Listeners
126
yes
More Rules
yes
More Triggers
no
Trigger Conditions Met
no
yes
Consider Rule Execution
226

FIG. 19

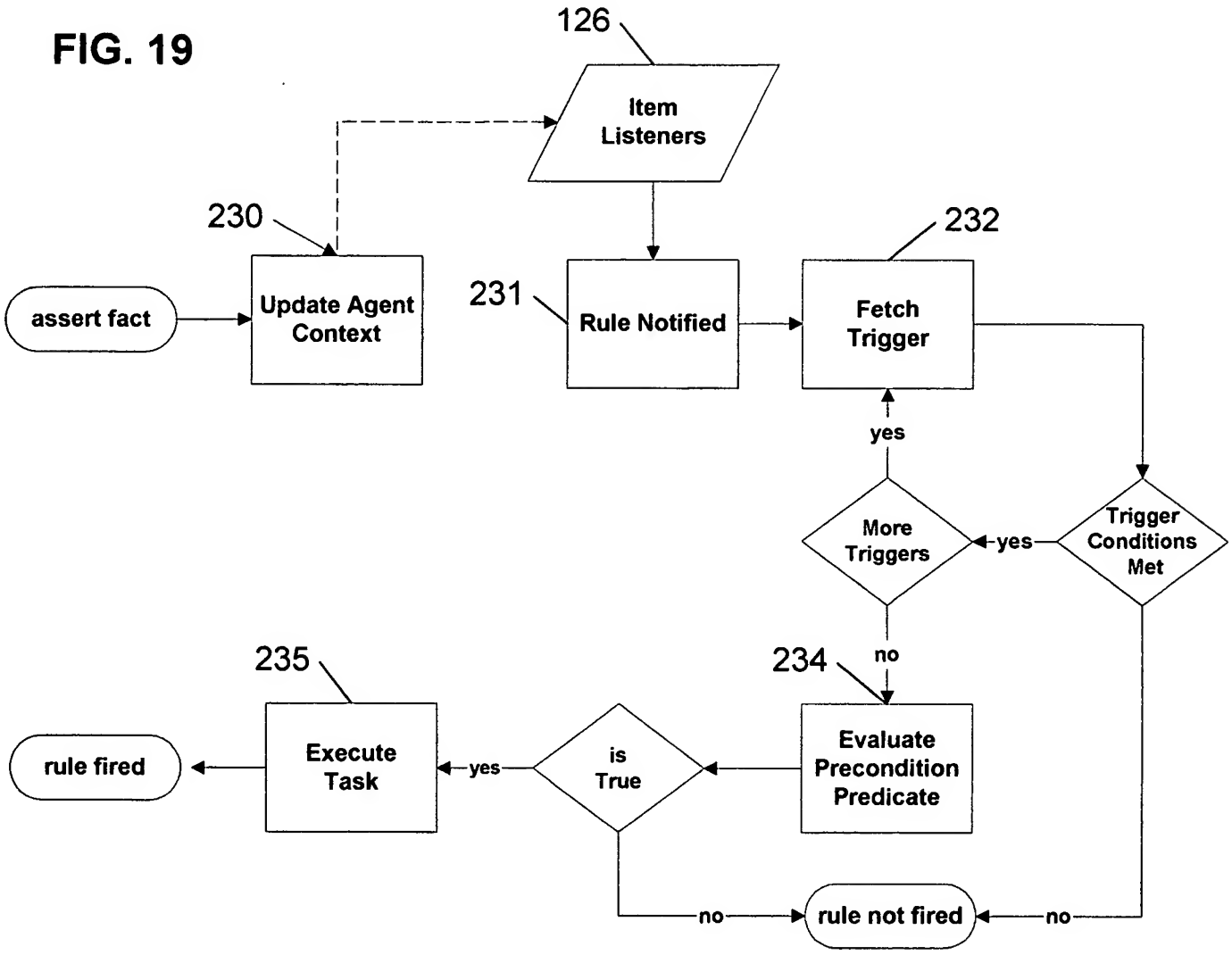

126
Item Listeners
230
232
assert fact
Update Agent Context
231
Rule Notified
Fetch Trigger
yes
More Triggers
yes
Trigger Conditions Met
no
235
234
rule fired
Execute Task
yes
is True
Evaluate Precondition Predicate
no
rule not fired
no

FIG. 20

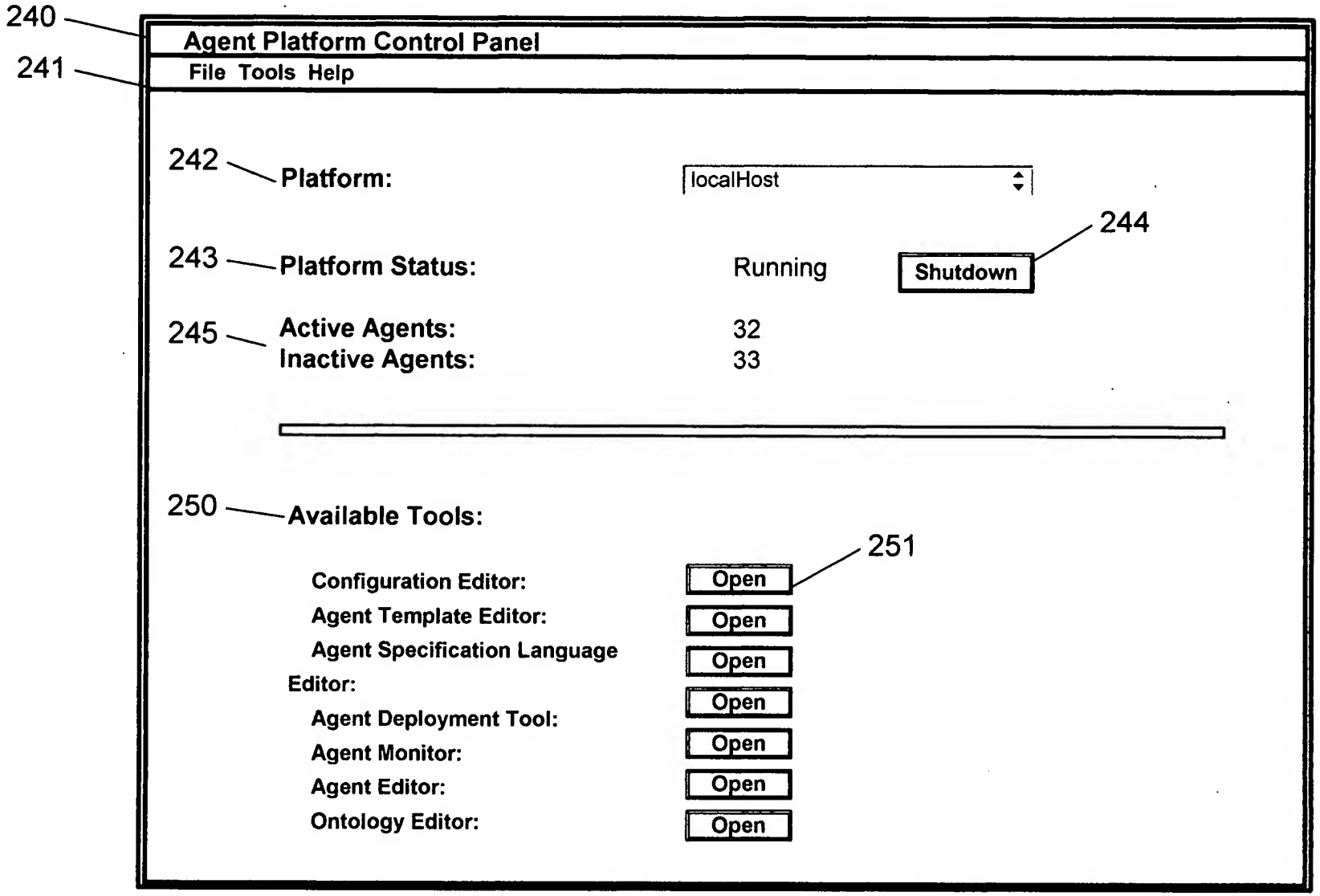

240
Agent Platform Control Panel
241
File Tools Help
242
Platform:
localHost
244
243
Platform Status:
Running
Shutdown
245
Active Agents:
32
Inactive Agents:
33
250
Available Tools:
251
Configuration Editor:
Open
Agent Template Editor:
Open
Agent Specification Language Editor:
Open
Agent Deployment Tool:
Open
Agent Monitor:
Open
Agent Editor:
Open
Ontology Editor:
Open

FIG. 21

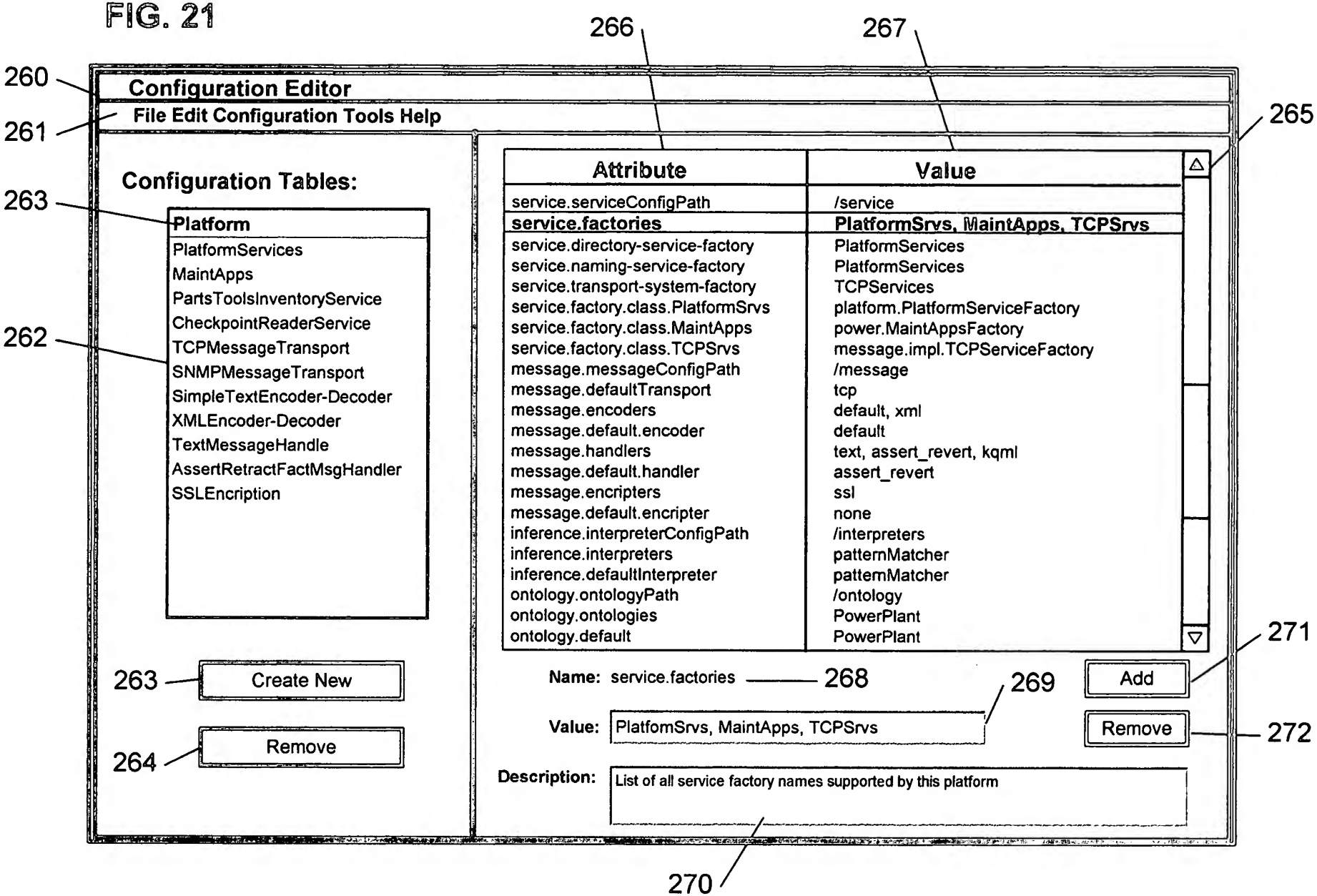

260
Configuration Editor
261
File Edit Configuration Tools Help
266
267
265
Configuration Tables:
263
Platform
PlatformServices
MaintApps
PartsToolsInventoryService
CheckpointReaderService
262
TCPMessageTransport
SNMPMessageTransport
SimpleTextEncoder-Decoder
XMLEncoder-Decoder
TextMessageHandle
AssertRetractFactMsgHandler
SSLEncription
Attribute
Value
service.serviceConfigPath
/service
service.factories
PlatformSrvs, MaintApps, TCPSrvs
service.directory-service-factory
PlatformServices
service.naming-service-factory
PlatformServices
service.transport-system-factory
TCPServices
service.factory.class.PlatformSrvs
platform.PlatformServiceFactory
service.factory.class.MaintApps
power.MaintAppsFactory
service.factory.class.TCPSrvs
message.impl.TCPServiceFactory
message.messageConfigPath
/message
message.defaultTransport
tcp
message.encoders
default, xml
message.default.encoder
default
message.handlers
text, assert_revert, kqml
message.default.handler
assert_revert
message.encripters
ssl
message.default.encripter
none
inference.interpreterConfigPath
/interpreters
inference.interpreters
patternMatcher
inference.defaultInterpreter
patternMatcher
ontology.ontologyPath
/ontology
ontology.ontologies
PowerPlant
ontology.default
PowerPlant
271
263
Create New
Name: service.factories
268
269
Add
264
Remove
Value:
PlatfomSrvs, MaintApps, TCPSrvs
Remove
272
Description:
List of all service factory names supported by this platform
270

FIG. 22

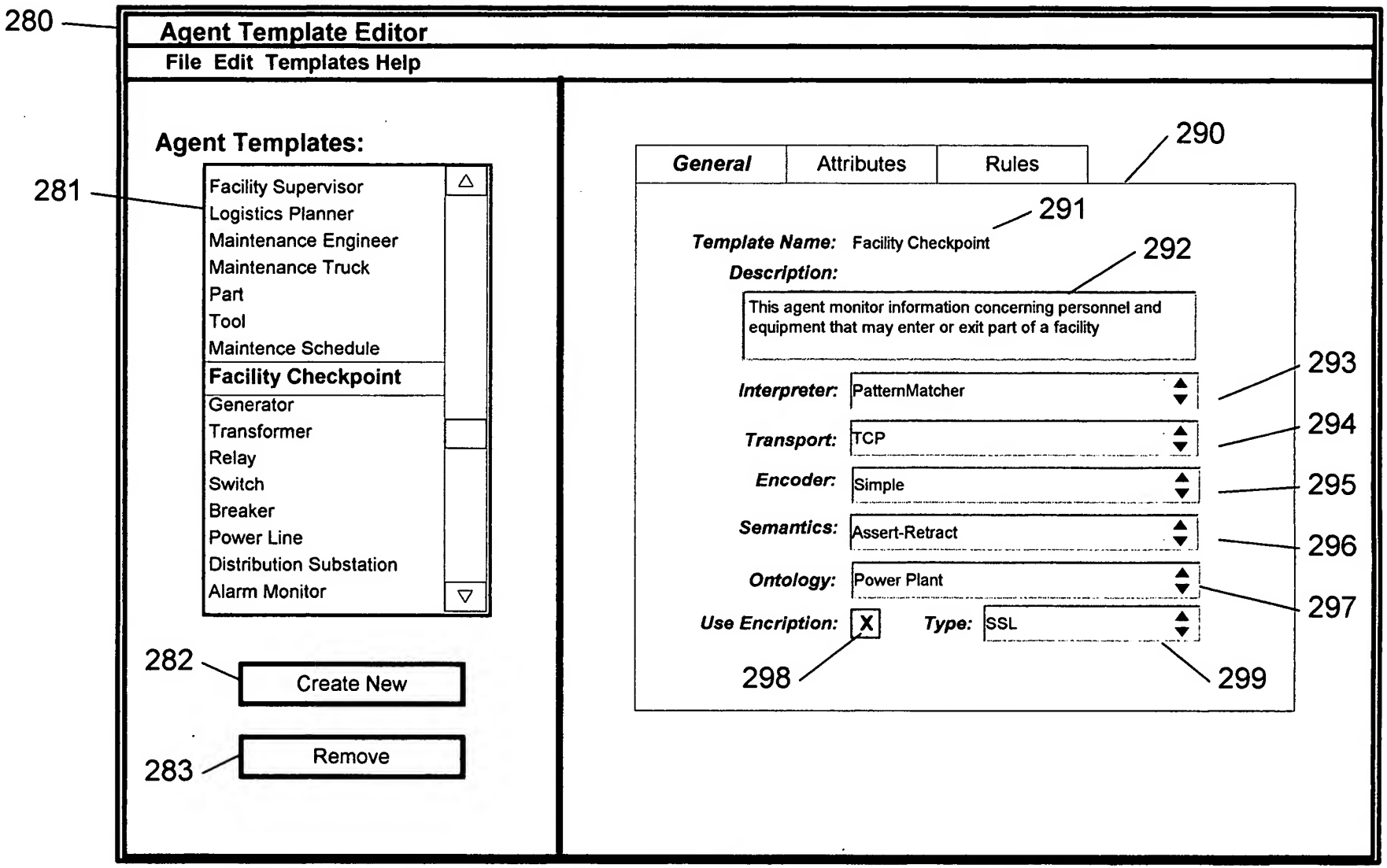

280
Agent Template Editor
File Edit Templates Help
Agent Templates:
281
Facility Supervisor
Logistics Planner
Maintenance Engineer
Maintenance Truck
Part
Tool
Maintence Schedule
Facility Checkpoint
Generator
Transformer
Relay
Switch
Breaker
Power Line
Distribution Substation
Alarm Monitor
282
Create New
283
Remove
290
General
Attributes
Rules
291
Template Name: Facility Checkpoint
292
Description:
This agent monitor information concerning personnel and equipment that may enter or exit part of a facility
293
Interpreter: PatternMatcher
294
Transport: TCP
295
Encoder: Simple
296
Semantics: Assert-Retract
297
Ontology: Power Plant
Use Encription: X
Type: SSL
298
299

FIG. 23

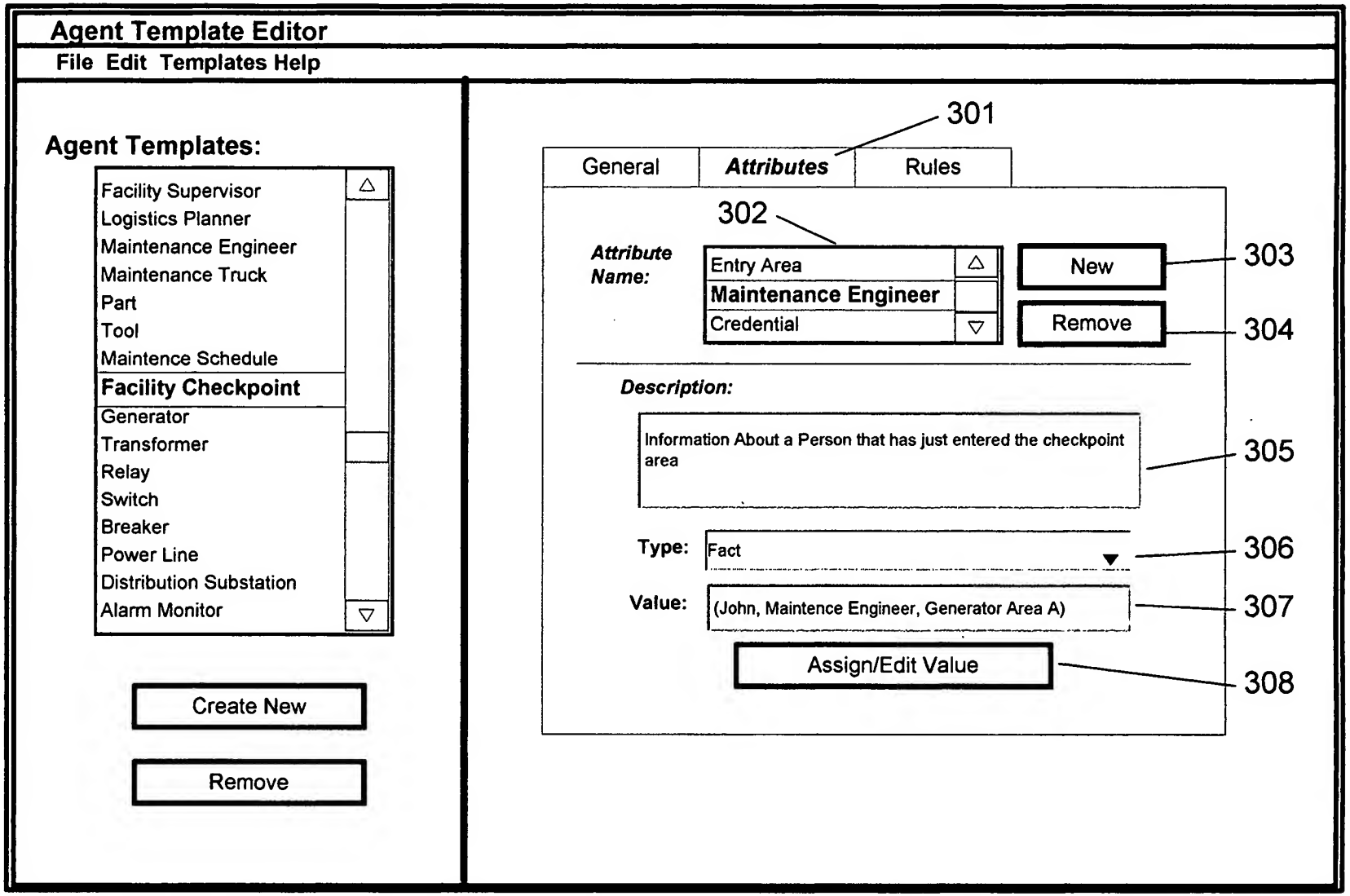

Agent Template Editor
File Edit Templates Help
Agent Templates:
Facility Supervisor
Logistics Planner
Maintenance Engineer
Maintenance Truck
Part
Tool
Maintence Schedule
Facility Checkpoint
Generator
Transformer
Relay
Switch
Breaker
Power Line
Distribution Substation
Alarm Monitor
Create New
Remove
301
General
Attributes
Rules
302
Attribute Name:
Entry Area
Maintenance Engineer
Credential
New
Remove
303
304
Description:
Information About a Person that has just entered the checkpoint area
305
Type:
Fact
306
Value:
(John, Maintence Engineer, Generator Area A)
307
Assign/Edit Value
308

FIG. 24

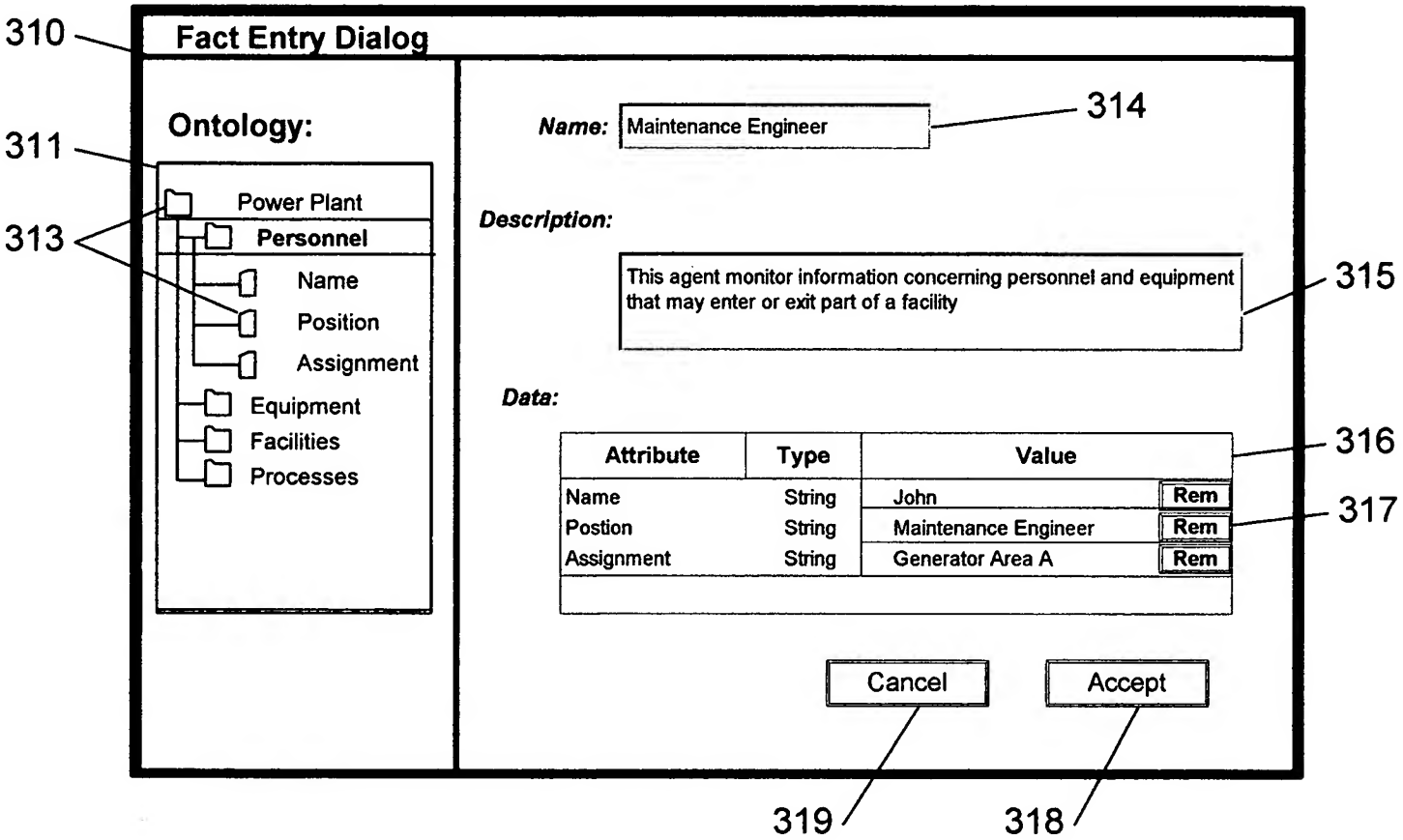

310
Fact Entry Dialog
311
Ontology:
313
Power Plant
Personnel
Name
Position
Assignment
Equipment
Facilities
Processes
Name:
Maintenance Engineer
314
Description:
This agent monitor information concerning personnel and equipment that may enter or exit part of a facility
315
Data:
316
Attribute
Type
Value
Name
String
John
Rem
Postion
String
Maintenance Engineer
Rem
317
Assignment
String
Generator Area A
Rem
Cancel
Accept
319
318

FIG. 25

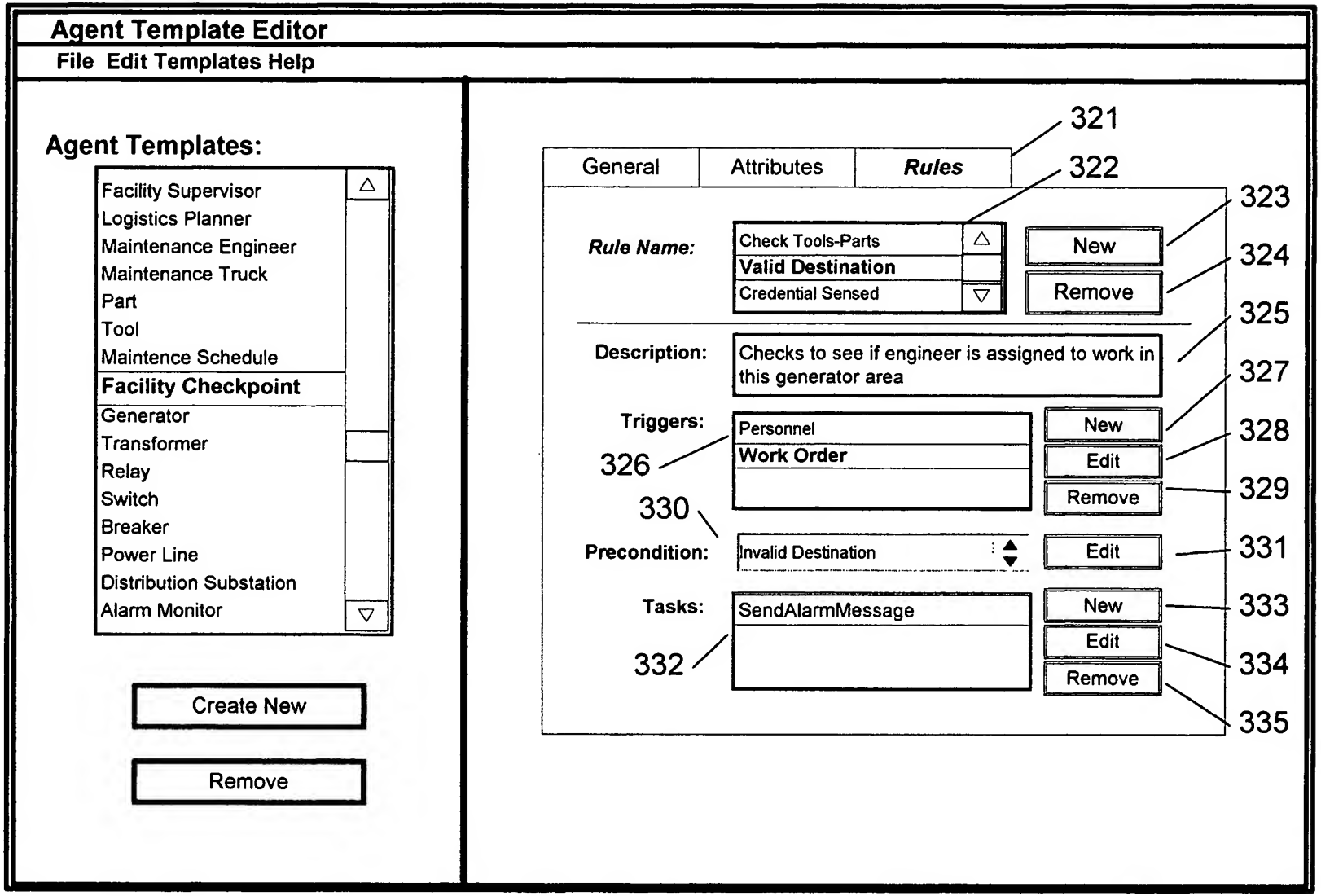

Agent Template Editor
File Edit Templates Help
Agent Templates:
Facility Supervisor
Logistics Planner
Maintenance Engineer
Maintenance Truck
Part
Tool
Maintence Schedule
Facility Checkpoint
Generator
Transformer
Relay
Switch
Breaker
Power Line
Distribution Substation
Alarm Monitor
Create New
Remove
General
Attributes
Rules
321
322
Rule Name:
Check Tools-Parts
Valid Destination
Credential Sensed
New
Remove
323
324
Description:
Checks to see if engineer is assigned to work in this generator area
325
Triggers:
Personnel
Work Order
New
Edit
Remove
326
327
328
329
330
Precondition:
Invalid Destination
Edit
331
Tasks:
SendAlarmMessage
New
Edit
Remove
332
333
334
335

FIG. 26

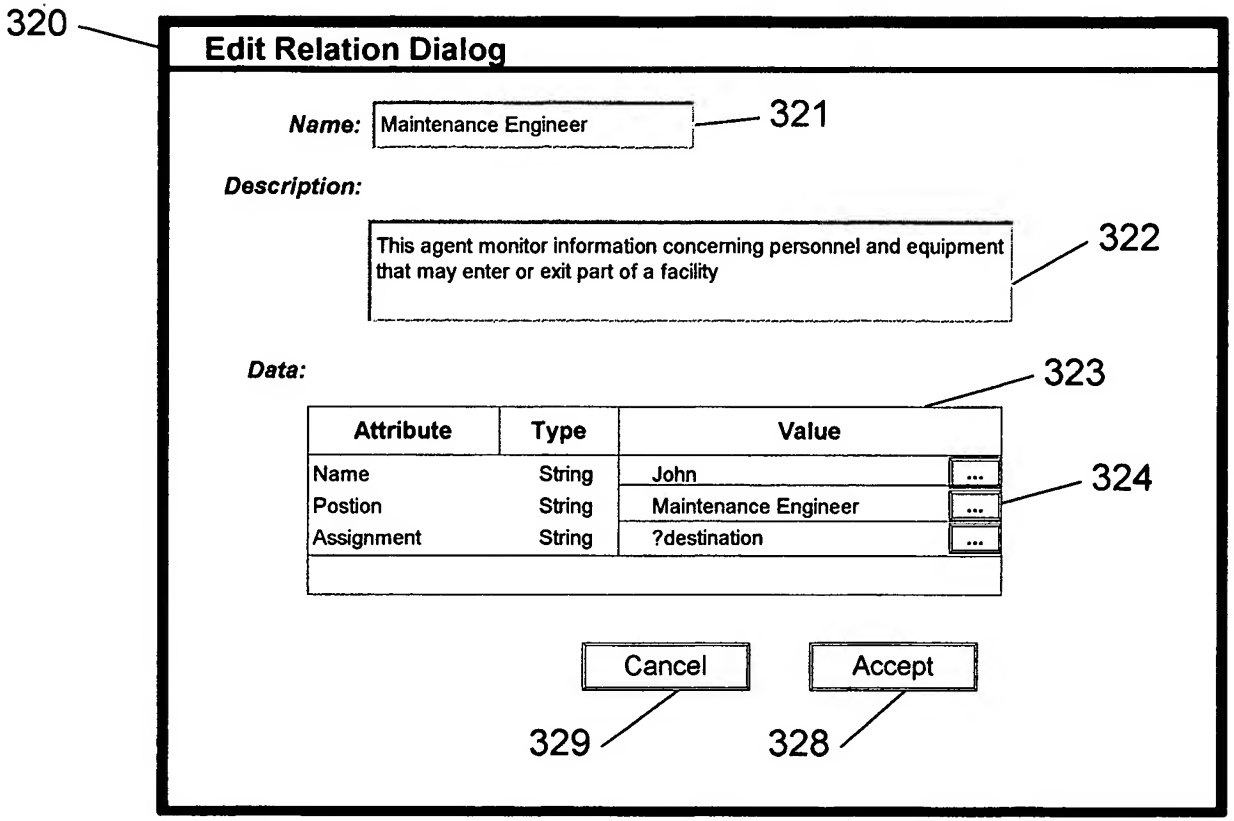

320
Edit Relation Dialog
Name:
Maintenance Engineer
321
Description:
This agent monitor information concerning personnel and equipment that may enter or exit part of a facility
322
Data:
323
Attribute
Type
Value
Name
String
John
Postion
String
Maintenance Engineer
Assignment
String
?destination
324
Cancel
Accept
329
328

FIG. 27

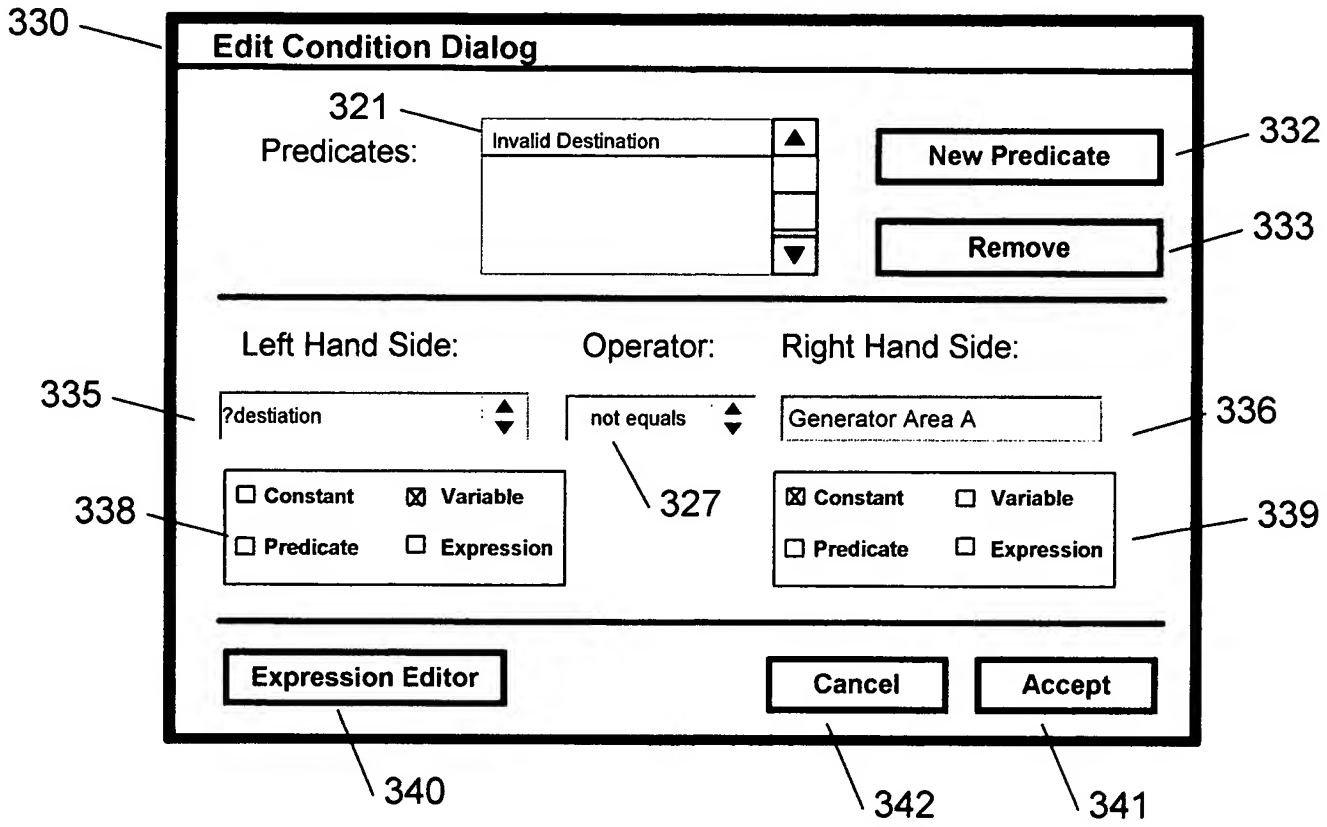

330
Edit Condition Dialog
321
Predicates:
Invalid Destination
New Predicate
332
Remove
333
Left Hand Side:
Operator:
Right Hand Side:
335
?destiation
not equals
Generator Area A
336
338
Constant
Variable
Predicate
Expression
327
Constant
Variable
Predicate
Expression
339
Expression Editor
Cancel
Accept
340
342
341

FIG. 28

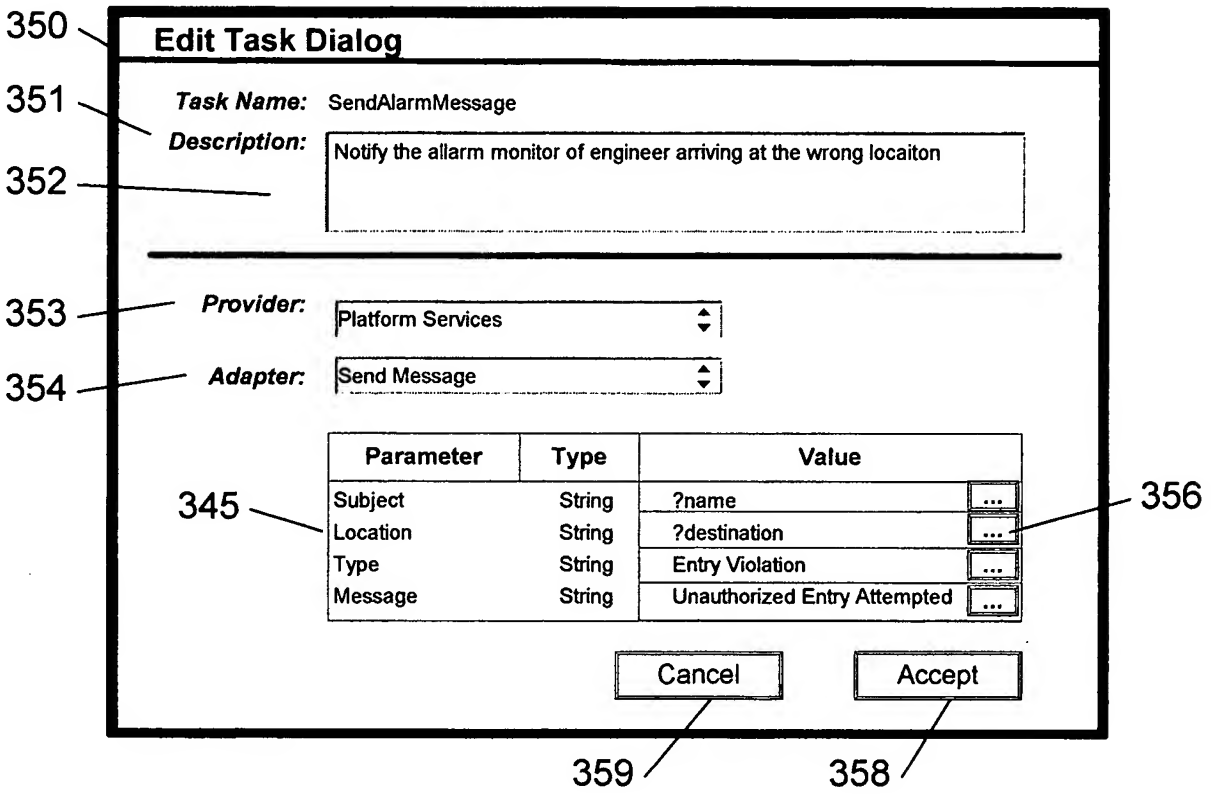

350
Edit Task Dialog
351
Task Name: SendAlarmMessage
Description:
Notify the allarm monitor of engineer arriving at the wrong locaiton
352
353
Provider:
Platform Services
354
Adapter:
Send Message
345
Parameter
Type
Value
Subject
String
?name
Location
String
?destination
Type
String
Entry Violation
Message
String
Unauthorized Entry Attempted
356
Cancel
Accept
359
358

FIG. 29

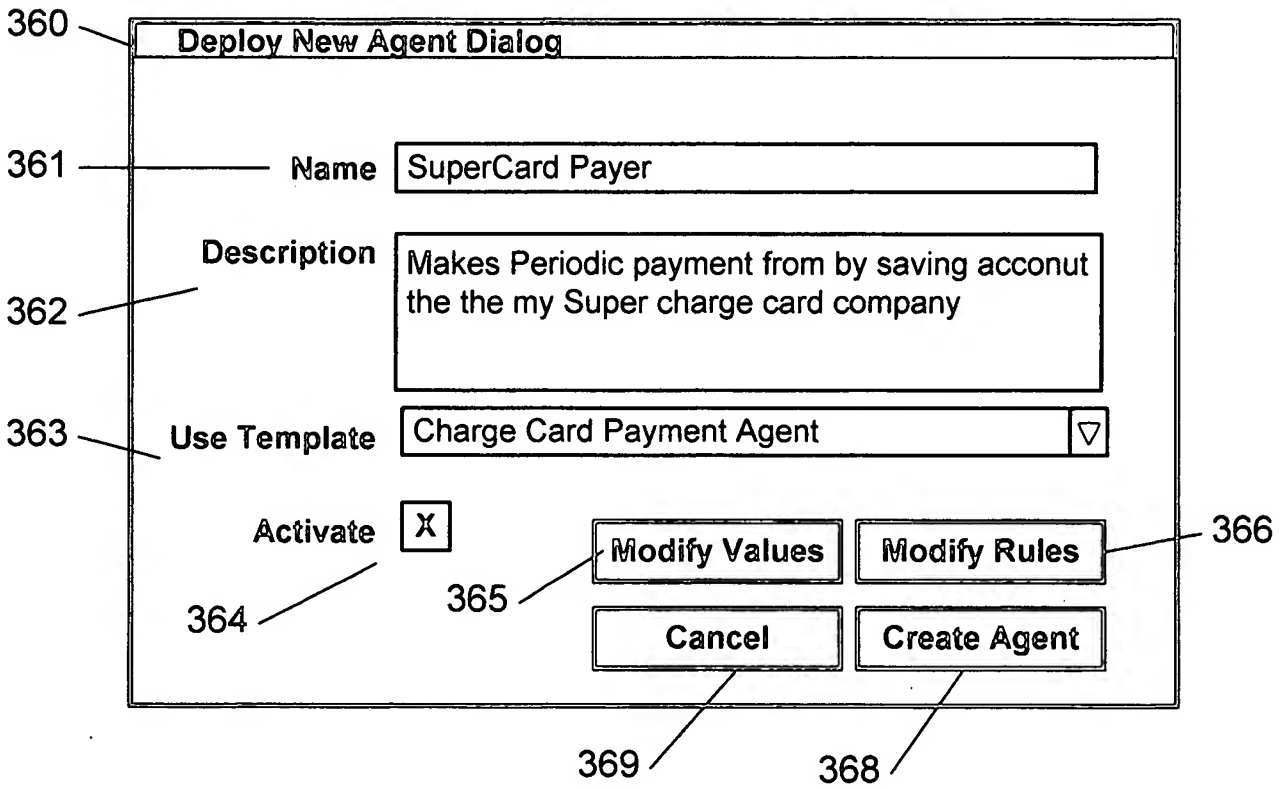
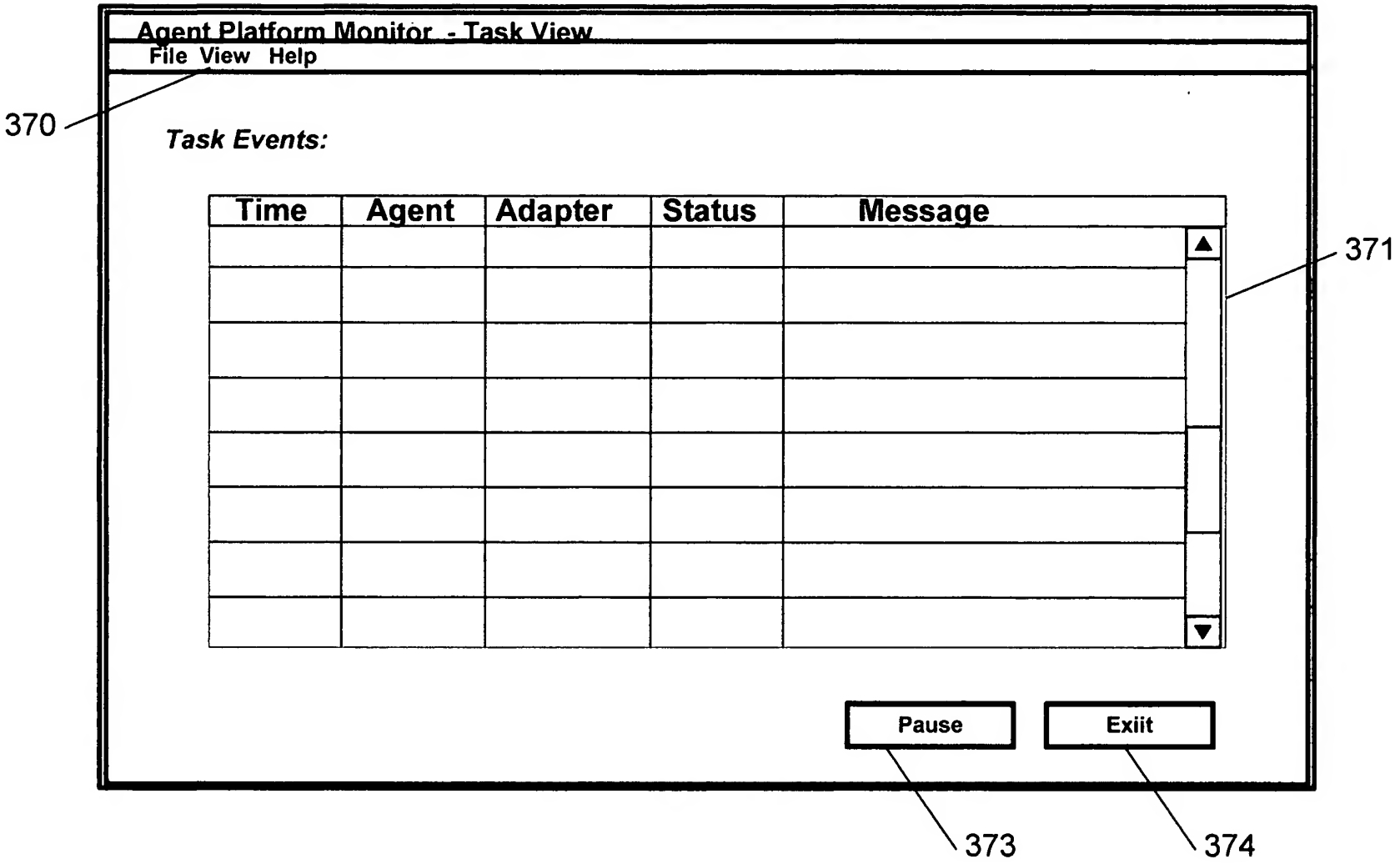

360
Deploy New Agent Dialog
361
Name
SuperCard Payer
Description
362
Makes Periodic payment from by saving acconut the the my Super charge card company
363
Use Template
Charge Card Payment Agent
Activate
X
364
365
Modify Values
Modify Rules
366
Cancel
Create Agent
369
368

FIG. 30


Agent Platform Monitor - Task View
File View Help
370
Task Events:
Time
Agent
Adapter
Status
Message
371
Pause
Exiit
373
374